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JOURNAL OF GENETIC PSYCHOLOGY

Child Behavior, Animal Behavior, and Problems of Aging

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VOLUME 100

1962

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Entered as second-class matter May 11, 1937, at the post-office at
Provincetown, Mass., under the Act of March 3, 1879
Second-class postage paid at Provincetown, Mass.

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THE JOURNAL PRESS
2 Commercial Street
Provincetown, Massachusetts
U. S. A.

$20.00 per year
$15.00 per volume
Single Numbers $7.50

QUARTERLY
Two volumes per year

March, 1962
Volume 100, First Half

Founded by G. Stanley Hall in 1891, reorganized by Carl Murchison in 1925

THE JOURNAL OF GENETIC PSYCHOLOGY

Child Behavior, Animal Behavior, and Problems of Aging

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MARCH, 1962

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Provincetown, Massachusetts, U. S. A.

Entered as second-class matter May 11, 1937, at the post-office at
Provincetown, Mass., under the Act of March 3, 1879
Second-class postage paid at Provincetown, Mass.

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The Journal of Genetic Psychology, 1962, **100**, 3-21.

IMAGES OF "OLD PEOPLE" AND "PEOPLE IN GENERAL" IN AN OLDER SAMPLE*[1]

Educational Testing Service and Cushing Hospital

NATHAN KOGAN AND FLORENCE C. SHELTON

A. INTRODUCTION

Using a sentence completion procedure, Golde and Kogan (1959) recently demonstrated that *college students'* images of "old people" differ in many respects from their images of "people in general." The present work inquires whether comparable differences are found among *older people* themselves.

Studies by Tuckman and Lorge (1954, 1958) have shown that older individuals may accept misconceptions and stereotypes about old people to an extent exceeding that of younger subjects. On the basis of these results, one might expect older subjects to have very different images of "old people" and "people in general." On the other hand, as Golde and Kogan have indicated, the Tuckman-Lorge work is vitiated by response set effects, with the consequence that the *S*s studied by the latter authors may have attributed many of the same misconceptions and stereotypes to "people in general." Indeed, there is some evidence that response set tendencies increase with age (Kogan, 1961).

The sentence completion test described in our previous work (Golde and Kogan, 1959), served to elicit young *S*s' images of old people in our society. A comparison of responses to "old people" stems ("experimental" items) with responses to matched "people in general" stems ("control" items) highlighted the unique qualities attributed to the older person by a college age sample. Such a comparison for older subjects entails certain complexities that are of but minor consequence for younger individuals. For the latter, there seems little doubt that "people in general" are perceived as peers, while "old people" represent a group remote from themselves in age. When older individuals constitute the sample under study, however, two distinct possibilities arise. Either older persons will conceive of "people in general" as of younger vintage

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* Received in the Editorial Office on July 1, 1960 and given prior publication in accordance with our policy regarding manuscripts on the subject of aging.

[1] This study was supported in part by the National Institute of Mental Health, United States Public Health Service, under Research Grant M-1867, and was conducted under the auspices of The Age Center of New England, Inc. The authors wish to thank Malcolm J. Arth, Peggy Golde, Jane Livermore, Mark McGrath and Judith W. Stephens for their assistance in the collection and analysis of the data. The statistical aid of John M. Robinson is gratefully acknowledged.

than "old people," or no distinction will be drawn between the two groups, i.e., older individuals will treat both "people in general" and "old people" items in age peer terms.

Different empirical consequences will necessarily follow dependent upon which of the above two possibilities best matches the orientation of the older subject. If the second alternative is most characteristic of the sample under study, then few differences should obtain between subjects responding to "old people" stems, on the one hand, and those responding to "people in general" stems, on the other. If, on the other hand, a majority of the item pairs yield significant differences, it will be evident that older *S*s do not conceive of "people in general" and "old people" as equivalent in objective age status. This, of course, would be a very general kind of inference, and would not tell us very much about the direction of the difference. For, older persons may consider the "old people" stem as referring to persons very much like themselves, while "people in general" are conceived to be younger; or older persons may subjectively place themselves outside of the class of "old people," preferring rather to conceive of themselves as members of the undifferentiated class of "people in general." Which of these two possibilities would be most applicable, if differences are found, would depend upon the specific content of the subjects' sentence completions and/or more general characteristics of the sample.

B. METHOD

1. *The Instrument*

In the earlier Golde-Kogan study, a set of 25 matched "experimental-control" sentence stems were employed. Five of these stems were omitted in the present work in view of their inappropriateness for an older sample. The remaining 20 paired stems (Table 1) reflected, among other factors, the emotions, physical attributes, interpersonal qualities, and values attributed to "old people" and "people in general." In the case of three of the experimental items (Nos. 7, 12, and 14), it was not possible to construct a matched control in the sense in which that term has been applied to the other items in the test. In those instances, control items were constructed analogous in some respect to the three experimental items in question.

2. *Subjects*

The sample was comprised of 89 men and 109 women, all volunteer members of The Age Center of New England, Inc., a non-profit gerontological research organization in Boston, Massachusetts. *S*s were in apparently good

TABLE 1
INCOMPLETE SENTENCE STEMS, SCORING CATEGORIES, PER CENTS OF RESPONSES, CRITICAL RATIOS, AND CHI-SQUARE VALUES

Item no.	Sentence stems	Categories	Per cents of responses: Experimental group	Per cents of responses: Control group	CR	*p*	Chi-square	*p*
1E.	Most old people's friendships are . . .	A. Enduring, deep	26.6	12.0	2.50	.05		
		B. Impermanent, shallow	5.3	20.7	3.14	.01		
1C.	Most people's friendships are . . .	C. Positive adjectives not included above	45.7	55.4				
		D. Negative adjectives not included above	4.3	4.3				
		E. *S* cites reason or condition of friendship	4.3	7.6				
		F. With people of own age group	7.4	0.0				
		G. Past, concluding, few	6.4	0.0				
			N=94	*N*=92			28.35	.001
2E.	In general, old people need . . .	A. Assistance (e.g., help, care)	2.2	4.6				
		B. Security (e.g., personal well-being)	1.1	3.4				
2C.	In general, people need . . .	C. Positive response from others (e.g., love)	75.6	74.7				
		D. Interests and activities	12.2	3.4	1.92	.10		
		E. Material things	8.9	5.7				
		F. Faith, religion	0.0	8.0				
			N=90	*N*=87			14.17	.05
3E.	When I am with an old person, I . . .	A. Negative feelings (e.g., discomfort, tension)	10.2	6.8				
		B. Positive feelings (e.g., well-being, ease)	21.6	36.4	2.16	.05		
3C.	When I am with another person, I . . .	C. Passive, subordinate response (e.g., respect)	12.5	10.2				
		D. General outgoing response (e.g., talk)	47.7	46.6				
		E. Awareness of age	8.0	0.0				
			N=88	*N*=88			11.14	.05

TABLE 1 (*continued*)

Item no.	Sentence stems	Categories	Per cents of responses		CR	*p*	Chi-square	*p*
			Experimental group	Control group				
4E. 4C.	One of the greatest fears of many old people is . . . One of the greatest fears of many people is . . .	A. Death or dying	6.1	19.6	2.81	.01		
		B. Loneliness, isolation	21.4	10.9	1.95	.10		
		C. Rejection, being disliked	9.2	10.9				
		D. Anxiety response (e.g., insecurity)	3.1	13.0	2.26	.05		
		E. Loss of powers, illness	16.3	9.8				
		F. Dependence	22.4	3.3	3.90	.001		
		G. Lack of money	21.4	32.6	1.73	.10		
			$N=98$	$N=92$			33.10	.001
5E. 5C.	Old people's appearance People's appearance . . .	A. Important, emphasis on maintenance	19.8	47.3	3.97	.001		
		B. Denial or qualification of importance	0.0	10.7	2.90	.01		
		C. Index of kind of person	9.9	23.7	2.52	.05		
		D. Positive, descriptive adjectives	26.4	9.7	2.95	.01		
		E. Negative, descriptive adjectives	22.0	5.4	3.32	.001		
		F. Varies, differs	13.2	3.2	2.23	.05		
		G. Age-related responses	8.9	0.0				
			$N=91$	$N=93$			55.20	.001
6E. 6C.	Old people tend to resent . . . People tend to resent . . .	A. Younger people	3.5	0.0				
		B. Intrusion, interference, dominance	21.2	39.3	2.59	.01		
		C. Rejection, lack of concern	16.5	3.4	2.67	.01		
		D. Criticism	11.8	34.8	3.59	.001		
		E. Condescension, being patronized	18.8	9.0	1.88	.10		
		F. Change or novelty	5.9	2.2				
		G. Reference to age or agedness	12.9	1.1	2.76	.01		
		H. Advice	9.4	10.1				
			$N=85$	$N=89$			38.34	.001
7E. 7C.	In our society, grandparents often are . . . In our society, parents often are . . .	A. Over-indulgent	3.5	37.9	5.50	.001		
		B. Controlling, withholding freedom	4.7	9.2				
		C. Undervalued, neglected, rejected	45.9	6.9	5.81	.001		
		D. Honored, respected, cherished	10.6	1.1	2.31	.05		
		E. Positive traits not included above	17.6	6.9	2.14	.05		
		F. Negative traits not included above	8.2	37.9	4.58	.001		
		G. Used as helpers, e.g., baby sitters	9.4	0.0				
			$N=85$	$N=87$			85.78	.001

TABLE 1 (*continued*)

Item no.	Sentence stems	Categories	Per cents of responses		CR	p	Chi-square	p
			Experimental group	Control group				
8E.	Sex for most old people . . .	A. Negligible or unimportant, past	68.1	3.5	8.97	.001		
		B. Essential	1.1	29.1	5.28	.001		
8C.	Sex for most people . . .	C. Negative, distasteful connotation, taboo	12.1	29.1	2.80	.01		
		D. Positive, pleasurable connotation	12.1	32.6	5.33	.001		
		E. Declined in importance but still exists	7.7	2.3				
		F. "Don't know" response	8.8	3.5				
			$N=91$	$N=86$			108.74	.001
9E.	Most of the old people I have known . . .	A. Response in terms of *S*s relation to other	8.9	14.9				
		B. Positive descriptive adjectives	74.4	71.3				
9C.	Most of the people I have known . . .	C. Negative descriptive adjectives	13.2	6.9				
		D. Demographic descriptive adjectives	3.3	6.9				
			$N=91$	$N=87$			4.34	.30
10E.	For an old man, work is often . . .	A. Tedious nature of work	7.1	13.5				
		B. Difficult nature of work	18.4	4.2	3.10	.01		
10C.	For a man, work is often . . .	C. Economic necessity of work	0.0	10.4	2.97	.01		
		D. Psychological importance, value, pleasantness of work	65.3	71.9				
		E. Unavailability of work	9.3	0.0	2.72	.01		
			$N=98$	$N=96$			30.30	.001
11E.	Old people, by and large, hope . . .	A. Peace, happiness, contentment, good things in general	22.5	54.3	4.42	.001		
11C.	People, by and large, hope . . .	B. Longevity and health	21.3	4.3	3.40	.01		
		C. Success, money, achievement, fame	0.0	23.9	4.88	.001		
		D. Independence, usefulness	23.6	2.2	4.28	.001		
		E. Not to be rejected, love, companionship	13.5	4.3	1.91	.10		
		F. Financial security, comfort	14.6	5.4	1.81	.10		
		G. Happy afterlife, immortality	4.5	5.4				
			$N=89$	$N=92$			68.47	.001

TABLE 1 (*continued*)

Item no.	Sentence stems	Categories	Per cents of responses		CR	p	Chi-square	p
			Experimental group	Control group				
12E.	When a woman becomes old . . .	A. Loses attractiveness	10.4	5.0				
		B. Anxiety over loss of attractiveness	5.2	11.3				
12C.	When a woman becomes older . . .	C. S cites negative emotional aspects of age	32.5	26.3				
		D. S cites positive emotional aspects of age	15.6	21.3				
		E. Changing family relationships	6.5	7.5				
		F. Maintaining activities and interests	15.6	10.0				
		G. Needs love, understanding, companionship	6.5	1.3				
		H. Appropriateness of outlook and behavior for age emphasized	7.8	17.5				
			$N=77$	$N=80$			11.26	.20
13E.	The thing I like best about old people . . .	A. Sincerity	1.1	14.9	3.10	.01		
		B. Kindness	7.9	8.0				
13C.	The thing I like best about people . . .	C. Serenity	13.5	0.0	3.35	.01		
		D. Gaiety, humor	4.5	9.2				
		E. Intelligence, wisdom	30.3	17.2	2.05	.05		
		F. Interactional qualities (e.g., companionability)	21.3	49.4	3.90	.001		
		G. Reminiscences	10.1	1.1	2.27	.05		
		H. Courage, determination, perseverance	11.2	0.0	2.91	.01		
			$N=89$	$N=87$			52.53	.001
14E.	Many old people think the younger generation . . .	A. Old fashioned, narrow-minded	1.1	37.6	6.19	.001		
		B. Foolish, wild, "going to the dogs"	83.0	2.2	11.07	.001		
		C. Positive traits or circumstances	9.1	8.6				
14C.	Many people think the older generation . . .	D. Useless, in the way	0.0	39.8	6.63	.001		
		E. Comparison with previous generations	6.8	11.8				
			$N=88$	$N=93$			137.69	.001

TABLE 1 (*continued*)

Item no.	Sentence stems	Categories	Per cents of responses		CR	*p*	Chi-square	*p*
			Experimental group	Control group				
15E.	The thing I like least about old people . . .	A. Controlling, interfering qualities	5.4	4.5				
		B. Rigid, prejudiced qualities	16.2	14.8				
15C.	The thing I like least about people . . .	C. Irritability	32.4	6.8	4.13	.001		
		D. Hypocrisy	0.0	15.9	3.24	.01		
		E. Selfishness	2.7	17.0	3.23	.01		
		F. Gossiping	0.0	6.8				
		G. Lack of consideration	0.0	21.6	4.00	.001		
		H. Garrulousness, talking of the past, repetitiveness	16.2	6.8				
		I. Disinterest, pessimism, indifference	10.8	5.7				
		J. Physical and mental decline, handicaps	8.1	0.0				
		K. Unattractive appearance, untidiness	8.1	0.0				
			$N=74$	$N=88$			74.33	.001
16E.	One of the greatest pleasures of many old people is . . .	A. Companionship	37.2	17.4	2.91	.01		
		B. Leisure time activities, recreation	11.6	35.0	3.64	.001		
		C. Reminiscing	19.8	1.2	3.72	.001		
16C.	One of the greatest pleasures of many people is . . .	D. Feeling useful, needed	7.0	12.8				
		E. Eating, smoking	2.3	5.8				
		F. Negative attributes	1.2	9.3	2.09	.05		
		G. Ownership, possessions	0.0	4.7				
		H. Interest in family	14.0	12.8				
		I. Talking	7.0	1.2				
			$N=86$	$N=86$			46.18	.001
17E.	For many old people, death . . .	A. Feared, frightening	10.6	46.7	5.47	.001		
		B. Positive (e.g., not feared)	33.0	3.3	5.21	.001		
17C.	For many people, death . . .	C. Inevitable	17.0	2.2	3.11	.01		
		D. Escape, release	34.0	14.4	3.11	.01		
		E. The end	2.1	14.4	2.80	.01		
		F. Life hereafter	2.1	7.7				
		G. Tragedy, sad	1.1	11.1	2.58	.05		
			$N=94$	$N=90$			79.84	.001

TABLE 1 (*continued*)

Item no.	Sentence stems	Categories	Per cents of responses		CR	p	Chi-square	p
			Experimental group	Control group				
18E.	When an old person sits down next to me on a train or bus, I . . .	A. No special behavior of feeling	18.9	31.9				
		B. Interest in other	77.9	63.8				
		C. Feelings of strain or withdrawal	3.2	4.3				
18C.	When a person sits down next to me on a train or bus, I . . .		$N=95$	$N=94$			4.54	.20
19E.	To be friends with an old person is . . .	A. Difficult, negative qualities	7.4	3.3				
19C.	To be friends with a person is . . .	B. Rewarding, other positive qualities	74.7	68.9				
		C. Emphasis on reciprocity in the relationship	6.3	23.3	3.27	.01		
		D. Helpful to other, duty, "kind thing to do"	11.6	4.4				
			$N=95$	$N=90$			13.82	.01
20E.	Most old people's lives are . . .	A. Negative (e.g., lack stimulation, happiness)	53.9	32.7	2.92	.01		
20C.	Most people's lives are . . .	B. Positive (e.g., happy, fulfilled)	27.0	35.6				
		C. Complicated, have their problems	9.0	26.7	3.08	.01		
		D. Emphasis on the past	6.7	0.0				
		E. Individual's responsibility	3.4	5.6				
			$N=89$	$N=90$			21.21	.001

health, non-institutionalized and generally average to superior in education and intelligence. Ages of the men ranged from 54 to 92 years, with a mean of 70.7 ($SD = 7.3$). The women ranged in age from 49 to 86 years, with a mean of 69.4 ($SD = 7.9$).

3. *Procedure*

The sentence completion forms were administered individually. Forms were alternated so that approximately one-half of the *S*s of each set received the experimental form (46 males and 55 females) while the remainder received the control form (43 males and 54 females). The instructions to the test specified that *S* complete the sentences with the "first thing that comes into your mind."

4. *Coding*

For most of the items, scoring categories derived in the Golde-Kogan work were applicable. In some cases, however, the addition of response categories was required to encompass the variety of sentence completions obtained from the *S*s. Such an expansion of the scoring scheme seemed preferable to forcing responses into previously established categories or increasing the frequency of cases in the "miscellaneous" category.

Once the categories were established, four independent judges coded the data: two of these coded responses to the experimental form, the other two coding responses to the control form. When *S*'s responses to a particular item contained more than one idea, judges were instructed to code each idea separately, alphabetizing them in the order of their appearance. Judges were informed of the mutual exclusiveness of the categories, and, hence, were instructed to code each response idea under one category only.

For the items on the experimental form, interjudge agreement ranged from 73 per cent to 97 per cent, with an average of 86 per cent. Interjudge agreement on the control items ranged from 50 per cent to 94 per cent, with an average of 81 per cent. Disagreements were resolved by presenting all of the discrepant categorizations to a fifth judge who decided which category was most appropriate.

5. *Statistical Comparison of Experimental and Control Data*

In order to facilitate statistical comparisons, some means had to be found for dealing with those *S*s emitting multiple responses to particular stems. Using all of the responses of all *S*s would give disproportionate weight to those of a more fluent disposition. Accordingly, where *S* responded with more than one idea, two judges attempted to code the entire response under the one category that seemed to best reflect the response in question. Again, interjudge agreements were resolved by another judge.

In carrying out statistical tests, the "Miscellaneous" category was omitted. This accounts for the variations in *N*s in Table 1. Differences between matched experimental and control items were tested with chi-square. Critical ratios were computed for the various categories within an item pair when chi-square values for the items as a whole were statistically significant at the .05 level or better. This served to identify the categories that were contributing most heavily to the chi-square value.

C. Results and Discussion

Table 1 presents the paired experimental and control sentence stems with their respective scoring categories, response percentages in these categories, critical ratios where significance is achieved at the .10 level or better, and over-all chi-square values.

Chi-squares significant at the .05 level or better were obtained for 17 of the 20 item pairs, indicating that older *S*s differentiate "old people" from "people in general." Accordingly, we can now effectively rule out the possibility that the present sample of older *S*s will conceive of both referent groups in comparable age peer terms.

Consider next the item-by-item results reported in Table 1:

1. *Most (old) people's friendships are . . . .* Approximately one-half of the *S*s attribute generally positive characteristics to the friendships of both "old people" and "most people." The observed experimental-control difference is largely due to the relative emphasis given "enduring, deep" as opposed to "impermanent, shallow" qualities. These findings largely parallel those obtained with college age *S*s in the Golde-Kogan work.[2] In the light of studies by Havighurst and Albrecht (1953) and Arth (1954) which report a paucity of deep friendships in old age, we concluded that younger *S*s hold "an idealized misconception about old people, for lifelong friendships may be perceived as a natural consequence of a long life" (pp. 356-357). The present data suggest that some older *S*s may hold such idealized misconceptions. However, one must not overlook the possibility that a *few* older persons will have succeeded in maintaining their friendships. Further, the greater attribu-

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[2] Any reference to younger *S*s or a college student sample in the remainder of the paper refers to the Golde and Kogan (1959) work. While there are sampling differences and some minor differences in code categories between that study and the present investigation, the similarities are sufficient to warrant comparisons, if only for heuristic purposes.

tion of "impermanent-shallow" to "most people's" friendships may be a projective expression of *S*s' present condition, in some cases.

2. *In general, (old) people need* . . . . The large majority of respondents consider a "positive response from others" a basic need of both "old people" and "people in general." Although the difference falls short of significance, there is a greater attribution of "interests and activities" to "old people" than to "most people." This finding seems to reflect the popular emphasis on such pursuits for old people. Relative to younger *S*s, who considered "old people" more in need of "assistance" than "people in general," the present sample of older *S*s rarely cites that category. This may well reflect the apparently healthy, non-institutionalized character of the older individuals under study.

3. *When I am with (an old) (another) person, I* . . . . Older *S*s appear to experience less positive feeling in the presence of "old people" than of "most people." Here we have indirect evidence of the ambivalence of the *S*s regarding their age status. This ambivalence, however, does not differentially affect the overt interaction with "old people" and "people in general," the former receiving as much "respect" and "outgoingness" as the latter. Younger *S*s, by contrast, were observed to be more respectful and less outgoing vis-à-vis "old people."

4. *One of the greatest fears of many (old) people is* . . . . Cited more often as fears of "old people" are "loneliness, isolation," and "dependence," while "death or dying," "lack of money," and "insecurity" are more frequently mentioned as fears of "people in general." The general findings with regard to loneliness and dependency conform to general expectations regarding the fears of older persons, and are reflected in the image of old people's fears observed in Golde and Kogan's college sample and in the sample of older *S*s studied by Kutner, *et al.* (1956). Of greater interest is the fact that older *S*s more frequently cite death, anxiety and financial shortcomings as fears of "people in general." It is quite conceivable that these control responses represent a projective expression of the actual fears of some of the *S*s.

5. *(Old) people's appearance* . . . . For this item pair, the experimental form more frequently evokes an evaluative reaction, while the control form seems to induce responses concerning the importance or meaning of appearance. It is evident that older *S*s differ among themselves in their descriptions of the appearance of "old people." Indeed, some *S*s refuse to generalize, maintaining that "old people's" appearance is a matter of individual differences. We were puzzled by the above findings, and, accordingly, attempted to find

some basis for the attribution of opposites. Our search led to an examination of subject sex differences, and the discovery that males were much more likely to attribute negative characteristics, females more prone to cite positive qualities. The latter's reaction has clear defensive overtones, possibly representing an attempt to deny age-related physical changes in a culture emphasizing female attractiveness. The relatively greater frequency of "importance" and "index of kind of person" for the control stem again is suggestive of a projective expression of concern with appearance in the lives of these older *S*s. Indeed, if appearance were less important, it is unlikely that some *S*s would find it necessary to deny or qualify its importance. A similar emphasis on the importance of appearance was observed in younger *S*s.

6. (*Old*) *people tend to resent* . . . . *S*s feel that "old people" are more likely than "people in general" to resent rejection, condescension, and reference to their age. Essentially these older *S*s claim that old people resent anything suggestive of special treatment because of age. "People in general," on the other hand, are presumed to resent "intrusion, interference, dominance, criticism"—qualities suggestive of exertion of some form of undesired control over the self. These findings are highly comparable to those obtained with college *S*s, with the exception that the latter group often cited "younger people" as one of the resentments of "old people," while the present set of respondents rarely mentioned "younger people" as such, though the acts resented would probably be carried out by persons younger than themselves.

7. *In our society*, (*grandparents*) *parents often are* . . . . Of particular note here is the contrast between the highly positive image of the grandparent and the very negative one of parents in our society. Regarding the former, *S*s either directly attribute positive qualities or maintain that society is not fully appreciative of the grandparent's virtues. When "parents" are the referent, on the other hand, "over-indulgence" and other negative traits are more frequently imputed. This contrast in the attribution of negative affect to parents and grandparents is somewhat surprising when one considers that most of the respondents have occupied both roles. Of course, the grandparent role will be more recent and current for the *S*s, and, hence, its importance and positive aspects more likely to be emphasized. With regard to the role of the parent, the negative image may reflect value conflicts with the current generation of parents regarding the rearing of children. Note the incidence with which "over-indulgent" is attributed to "parents." This effect was not obtained for a student sample, though these younger *S*s did agree with present respondents in considering the grandparent role more "undervalued and neglected."

8. *Sex for most (old) people . . . .* Differences for the present item pair largely paralleled those observed in the younger *S*s. Sex as "negligible or past," however, was cited by fewer of the present respondents to the "old people" stem.

9. *Most of the (old) people I have known . . . .* Responses to the experimental and control stem are not significantly different for the present item pair. The large majority of *S*s describe others in positive terms regardless of reference to age. By contrast, student *S*s described "old people" more positively, but were significantly less likely to respond in terms of an interpersonal relation with an old person.

10. *For a (an old) man, work is often . . . .* Work is more often described as "difficult" and "unavailable" for the "old man," and as an "economic necessity" for "men in general." These findings more or less parallel those obtained with college *S*s. While no significant difference obtained for the category "psychological importance, value, pleasantness of work," it is of note that the percentage of older *S*s found citing these characteristics is approximately twice that obtained in the Golde and Kogan younger sample. It may well be that the significance of work increases during the working years, or, perhaps, that work is valued more as opportunities decrease or as it is regarded in retrospect. In addition these results may partly reflect the cultural emphasis on the importance of work in the past relative to the prevailing current stress on the importance of leisure.

11. *(Old) people, by and large, hope . . . .* The hopes more frequently attributed to "old people" by the *S*s are in line with expectations, e.g., longevity and health, independence and usefulness, love and companionship, financial security and comfort. For "people in general" more emphasis is placed upon very general phenomena such as "peace" and "happiness," and more specific attributes relating to money and achievement. The results for the present item pair are similar to those obtained with younger *S*s.

12. *When a woman becomes (old) (older) . . . .* No significant difference obtained for the present item pair. When responses to both stems are combined, one finds that negative concomitants of aging are more frequently ascribed to the old(er) women than any other single description. Again, the responses of younger *S*s exhibited a similar pattern.

13. *The thing I like best about (old) people . . . .* The present item pair evokes various positive "stereotypes" regarding old people. Older *S*s cite qualities of "serenity" and "intelligence" as do younger *S*s, but unlike the latter, *S*s in the present sample also cite "reminiscences" and "courage" more frequently in the "old people" stem. "People in general," on the other hand,

are liked more for their "interactional qualities" and "sincerity" by both older and younger *S*s.

14. *Many (old) people think the (younger) (older) generation . . . .* The present item pair affords an opportunity to examine the extent of complementarity attributed to the views the younger and older generations hold of each other. It can be seen that the large majority of *S*s feel that many old people hold a very unflattering image of the younger generation. In this respect, younger *S*s may have been quite realistic in their view that old people consider the younger generation "wild" and "foolish." Virtually all of these younger *S*s felt that the prevalent view of the older generation stressed "old-fashioned" and "narrow-minded" qualities. By contrast, responses in the present sample to the same item were about equally divided between the above category and "useless, in the way." The latter finding further emphasizes the extent to which these older *S*s are sensitized to rejection by a dominant group of younger individuals.

15. *The thing I like least about (old) people . . . .* It will be noted that qualities of "irritability" are more frequently attributed to "old people." Since "serenity" was more often considered one of the best liked characteristics of "old people" (item No. 13), there would, at first blush, seem to be some inconsistency in the image of the old person. Of course, it is entirely possible that different *S*s cited the opposing qualities under consideration. As we have shown elsewhere (Kogan, 1960), however, older persons' image of themselves and other older people is likely to be of so very ambivalent a nature as to give rise to the same *S* endorsing "old people" statements of apparent logical oppositeness. Results for younger *S*s were very similar to those reported above. A difference of some importance, however, is the frequency with which "lack of consideration" was assigned to "people in general" by the *S*s of the present study, a finding consistent with a theme of desired equal treatment despite one's age.

16. *One of the greatest pleasures of many (old) people is . . . .* "Companionship" is more frequently considered one of the greatest pleasures of "old people," again demonstrating the perceived importance of interpersonal relations for older persons. "Reminiscing," cited as one of the best liked qualities of "old people" (item No. 13) appears again as one of their greatest pleasures. In view of the popular emphasis on keeping the elderly occupied, it is notable that the present *S*s consider "old people" less likely than "most people" to derive pleasure from leisure time and recreational activities. The "negative attributes" assigned more often to "most people" includes such behaviors as gossiping and complaining. Not surprisingly, "love and sex,"

mentioned by a substantial number of younger *S*s as a greatest pleasure of "people in general," was conspicuous by its absence in the protocols of the older *S*s.

17. *For many (old) people, death* . . . . The idea of death is considered more frightening to "people in general" than it is to "old people," a finding consistent with that reported above (No. 4). Old people are more often alleged not to be fearful of death, to regard it as an "escape," or at least to accept it as "inevitable." On the other hand, death is considered more "tragic" for "people in general." Below (No. 20) it will be shown that the *S*s characterize the lives of old people as lacking stimulation and happiness. Under these circumstances, it is hardly surprising that fears of death are not imputed to "old people" as often as they are to "people in general." Younger *S*s were in fundamental agreement with the *S*s in the present sample regarding the differential fearfulness of death for "old people" and "people in general."

18. *When a (an old) person sits down next to me on a train or bus, I* . . . . Reactions to a person in this situation do not seem to be differentially influenced by the age status of that person. When responses to both stems are considered, it appears that the most frequent reaction is a display of "interest in the other person." Young *S*s, by contrast, were found to exhibit more interest when the person on the train or bus was not specified as old. It is hardly surprising, of course, that older *S*s compared to those younger will make more of an effort at interaction in a social situation involving an older person.

19. *To be friends with a (an old) person is* . . . . The large majority of responses in the "rewarding" category for both stems emphasizes the importance of friendship for the *S*s. It is noteworthy, however, that the reciprocal aspects of friendship are more likely to be stressed for a person of unspecified age. This difference also obtained for younger *S*s.

20. *Most (old) people's lives are* . . . . The lives of "old people" are portrayed more negatively than those of "people in general," whereas the latter are characterized as having more complicated, problem laden lives. Younger *S*s, by contrast, did not show any significant differences in their responses to the members of the present item pair, and indeed more than two-thirds of their responses fell into the "negative" category. The *S*s in the present sample manifested considerably more optimism in their evaluation of "most people's" lives.

D. CONCLUSIONS

The results of the present work clearly demonstrate that individuals of advanced age distinguish between "old people" and "people in general" when imputing various qualities to those reference groups. Accordingly, we now know that older individuals will not necessarily conceive of both of the above groups in age peer terms. Rather, *S*s' responses clearly indicate that "people in general" are viewed as younger. Whether the *S*s consider themselves within the class of "old people" or of "people in general" cannot be ascertained from the present data. There is some evidence in a paper by Kogan and Wallach (1961) that the *S*s in the present sample are less likely to consider themselves "elderly" than "not elderly." One cannot, however, infer from these findings that *S*s assigned themselves to the "people in general" class in their sentence completion responses.

While there are a number of notable discrepancies between the responses of older *S*s and those of the Golde-Kogan study, the similarities between old and young far exceed the differences. These results point to the relatively high degree of accuracy of younger *S*s in assessing the needs, hopes, values, etc., of older people. Such a conclusion, however, must necessarily remain tentative pending a study of older individuals who unequivocally identify themselves as "old."

While the sentence completions of the older respondents of the present study bear a considerable resemblance to those of younger college students, the few differences that emerge serve to point up the ambivalence of older *S*s regarding their age status. Thus, the greatest differences between older and younger *S*s seem to occur for those item pairs where a personal relationship with a specific other is implied (Nos. 3, 9, and 18). For the latter two of these items, no significant differences obtained between the members of the incomplete sentences pair in the present sample. These older *S*s, in other words, described the "old people" they knew in much the same terms as they described "most of the people" they knew. Similarly, a person sitting down next to one in a train or bus receives the same reaction regardless of age. Both of these item pairs yielded significant differences for younger *S*s, who were less likely to stress the existence of and interest in an interpersonal relationship when the other was specified as old.

Results for item pair No. 3 were consistent with the above findings. It will be noted that *S*s were as likely to exhibit a "general outgoing response" when with an "old person" as when with "another person." (More positive feelings occur in the latter case.) For younger *S*s, we found a highly significant difference for this particular category, with considerably less "outgoingness" manifested toward an "old person."

In sum, while the older *S*s in the present sample attribute different qualities to "old people" and "people in general," these differing images apparently have little bearing on interpersonal relations with specific older people—acquaintances and strangers. How can we account for these findings? It is entirely possible that items requiring a generalization about old people as a whole are likely to evoke prevalent social images in the old as well as the young. Where the older individuals are ambivalent about or deny outright their elderly status, it is all the more likely that age distinctions among *S*s will not exert a differential effect upon responses to generalized "old people" items. When, however, an item requires the respondent to evaluate his older friends and acquaintances or to specify how he would react to an older stranger in a particular situation, the usual culturally shared images, whether positive or negative, are no longer applicable. Here, there is every reason to expect an older person to experience less strain with an age peer, than would a younger individual with someone two generations removed in age. If ambivalence or denial of one's own elderliness characterizes many of the *S*s, it does not seem to bring about a wish to reject others who are avowedly old.

Consider next some of the underlying themes cutting across item pairs. To begin with interpersonal relations, *S*s do make distinctions between "old people" and "people in general." As we have seen above, however, such distinctions are not made when the self is directly involved in the relationship. Rather, differences appear when generalizations are made about the form and function of interpersonal relations in the two reference groups under study. Thus, "old people" are more frequently considered to have enduring and deep friendships, to fear loneliness and isolation, to resent rejection and lack of concern, to hope for love and companionship, and to derive their greatest pleasure when these are achieved. By contrast, "people in general" are more frequently perceived to have impermanent and shallow friendships, to arouse positive feelings when in their company, to be valued for their companionability (and censured for their lack of consideration), and to induce feelings of reciprocity in friendship.

There is an obvious difference in the two response patterns outlined above. Essentially, the older individuals in the present sample stress the *need* that "old people" have for satisfying interpersonal relationships, while emphasizing the *gratification* derived from friendly associations with "people in general." In the latter case, however, there is the risk of disruption and/or cessation of the relationship, since "people in general" appear to be more fickle and inconsiderate. As was observed with younger individuals, the *S*s of the present study, while recognizing the interpersonal needs of old people are not especially seeking to become interpersonally involved with them. It is entirely feasible, of course, that many of the *S*s' friendships are with age peers; such friends may be regarded as similar to the self with respect to age, i.e., not yet elderly.

Notions of "life" and "death" are different for "old people" and "people in general." For the former, life is regarded as unstimulating, and, accordingly, it is not too surprising that death is considered an escape or release. For the latter, life is viewed as more complicated, which is suggestive of future challenge. Under these circumstances, death tends to be viewed as fearful and tragic.

Some of the response differences for other item pairs are consistent with the above results. Thus, "old people" are more frequently cited as needing "interests and activities"—an obvious antidote to a dull unstimulating life. In addition, the psychological importance of work is emphasized though such work may be more "difficult" for the old man than the younger man. Further, "old people" are more often assigned hopes of "independence and usefulness." Essentially, the respondents are emphasizing the importance of continued life interests, activities, and work for warding off the infirmities of aging.

We shall conclude with a few brief comments about the implications of the present work for relations across age generations. In the Golde and Kogan paper, we reported as follows: "If the younger generation believes the older generation is old-fashioned and narrow-minded and, in turn, thinks the older generation views them as wild and foolish, the interpersonal relationships that do develop will, in part, reflect these views. Furthermore, old people can hardly be expected to be totally unaware of such attitudes and beliefs. Research on an older sample would obviously be required, however, to determine whether old people's feelings about the younger generation and their perceptions of the latter's feelings toward themselves do, in fact, mirror younger people's feelings and perceptions" (p. 359). On the basis of the present research, we are forced to conclude that younger *S*s were quite accurate in assessing older people's views of the younger generation as "foolish and wild." No doubt, this view reflects the attitude imputed to be held by "people in general" toward the older generation—"old-fashioned," narrow-minded," and "useless." In brief, there seems to be considerable complementarity in these mutual perceptions, though it may be noted that older people are equally perturbed by being considered useless and narrow-minded. Younger *S*s rarely mentioned the former quality, possibly because the fact of old people feeling "in the way" is a remediable interpersonal phenomenon, whereas qualities of "narrow-mindedness" may be conceived in purely intrapsychic terms, thereby absolving the younger person of any responsibility for the present status of the older individual.

E. SUMMARY

A sentence completion procedure was employed to determine whether differences in the image of "old people" and "people in general" observed in younger *S*s would also be found among older people themselves. The sample was comprised of 109 women and 89 men ranging in age from 49 to 92 years, non-institutionalized and of apparently good health. An "experimental" sentence completion form containing 20 stems referring to "old people" was administered individually to approximately one-half of the *S*s. The remaining half received the "control" form, which referred to "people in general," but was otherwise identical in content. Code categories relevant to each item pair were derived, and a set of independent judges scored the material with a high degree of agreement. Significant differences were obtained for 17 of the 20 item pairs. Results for each item pair are discussed in detail, and underlying themes cutting across particular item pairs are considered.

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A PROPOSED BATTERY OF CHILDHOOD TESTS FOR DISCRIMINATING BETWEEN DIFFERENT LEVELS OF INTACTNESS OF FUNCTION IN ELDERLY SUBJECTS*

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A. INTRODUCTION

Though interest in the gradual restriction and deterioration of psychological function in elderly individuals has for some years been very strong (9, 13, 16, 18, 20, 22, 28), and increasing, psychologists and gerontologists appear to be in general agreement that we are as yet far from having found or developed an effective battery of tests for measuring this restriction and deterioration. It is quite generally admitted by those in charge of the care of elderly patients that the manner and verbalization of such patients or even their performance on some standard intelligence tests is often a misleading clue as to their actual level of competence.

Fisher (10) in 1950 writes on "the limitation of available tests" in this field. Kaplan (15) in 1952 notes that "although interest in the psychology of later maturity has increased markedly since 1946, few clinical psychologists have concerned themselves with the problems of aging. Appropriate clinical instruments have yet to be developed and broad research studies are still lacking." And Birren (8) comments, as recently as 1958, "Research on aging is still in an undeveloped stage."

Criticisms as to the lack of effectiveness of currently available tests of varied aspects of intellectual function in the aging are many. Typical are the following:

Birren (7) concluded in 1952 that because the Wechsler Bellevue Scale "does not include tests of many of the known primary mental abilities it is of limited value in describing age changes in the intellect." And Shapiro in 1956 (21) found that "for 102 patients (over sixty) categorized as functional, organic, and doubtful, a battery of tests of memory function was unable to differentiate the groups, even so well as a simple perceptual test

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* Received in the Editorial Office on September 17, 1960, and given prior publication in accordance with our policy regarding manuscripts on the subject of aging.

such as the Bender-Gestalt. It is suggested that many of the clinical tests of memory commonly used by psychologists in testing the aged are of limited usefulness for the purpose."

In addition to a general acceptance of the fact that an adequate test or battery of tests for measuring psychological function in the elderly is lacking, we find in the literature comments to the effect that we are also lacking in an understanding of the specific nature of psychological decline. Thus Vinson (25) in 1952 notes that "if the clinician is to be successful in his effort to rehabilitate the patient, he must first understand the nature of psychobiological decline, and later the limitations in terms of impairment of integrative function. Only then is he in a position to assist the patient in accepting his limitations as imposed by the aging process." He stresses the desirability of a series of decline studies comparable to developmental studies. Welford (27) supports this point of view of the importance of a knowledge of decline of function in old age, in summarizing his studies on the change in performance from young adulthood through the middle years to the sixties and seventies. He concludes that study of middle and old age provides not only knowledge about the processes of ageing but also "a magnifying glass to human performance."

B. Subjects

Subjects for the present study were 100 guests of the Masonic Home in Wallingford, Connecticut. This initial group of subjects was chosen largely on the basis of being willing to be tested and well enough both physically and mentally to cooperate in taking the battery of psychological tests which we proposed. Of this initial group, 9 were classed by us, on the basis of their responses to the Rorschach test as being "normal"; 30 as being "intact presenile"; 39 as "medium presenile"; and 22 as "deteriorated presenile."

From this initial group of 100 subjects, 60 were chosen for further testing. This selection was made not on the basis of degree of psychological intactness or deterioration, but rather on the grounds of willingness, cooperativeness, and enough visual and auditory acuity to make further participation in the study practical.

1. *Age and Sex*

Of the 60 subjects thus selected, there were 35 female subjects, 25 males. Ages ranged from 69 to 92 with a mean age for women of 80, for men of 83. Median ages were 80 for women, 85 for men. Table 1 gives data for age and sex of subjects.

TABLE 1
AGE AND SEX OF SUBJECTS

Age in years	Females	Males	Total
65-69	2	0	2
70-79	11	7	18
80-89	20	17	37
90-	2	1	3
Totals	35	25	60

2. *Socio-economic status*

A large cluster of different specific items of information about individuals—their education, occupation, income level, social class, community status—are commonly grouped under the general heading of socio-economic status (SES). Since an individual's status partly derives from his own ability level, and partly determines the extent and types of many contacts he has with his environment, some index of this status is generally found to bear a relationship to most psychological functions that have been measured in the ability and personality fields.

Because of the high degree of interrelationship among the various items in this cluster, any single item generally serves as a fairly satisfactory estimate for the total complex. For this present group of old people we have information only on occupational level (or in the case of most women subjects, of husband's occupational level). For purposes of comparison, we include a tabulation of the same data for the total U.S. population in this age range and geographic area, computed from the U.S. Census data (23). Occupation is classified on the Minnesota Scale of Paternal Occupations (14).

Table 2 shows that subjects of all levels of social status and ability were included in our sample, but that those of higher levels are overly represented, in comparison with total U.S. population.

TABLE 2
MEN'S OWN AND WOMEN'S OWN OR HUSBAND'S OCCUPATIONS ON THE MINNESOTA SCALE (Compared with the 1920 U.S. Census Data when Current Population was Aged 29 to 52).

Class	Type of occupation	Percentage Total sample	Census
I.	Professional	5%	3%
II.	Semi-professional, managerial	13	5
III.	Clerical, skilled, retail business	26.6	14
IV.	Farmers	5	19
V.	Semi-skilled, minor business	30	27
VI.	Slightly skilled	6.6	13
VII.	Day laborers	5	19
	Unclassified	8	

C. Problem and Procedure

The purpose of this investigation was to determine whether or not a differential diagnosis of degree of intactness of personality and intellectual functioning could be made in a group of elderly subjects on the basis of a battery of psychological tests used customarily at the preschool and early school levels.

The present study offers the hypothesis that in spite of seeming intactness in certain areas (good vocabulary, reasonably good memory, apparent social adequacy) many elderly individuals are functioning, at least in some respects, at what amounts to a preschool level. And that if this is the case, preschool or early school-age tests will yield a better indication of exact level of performance and possible functional adequacy than will the type of adult tests customarily given. It also suggests that in order to measure effectively the decreasing levels of effective performance in elderly subjects, the clinician needs to understand the succeeding steps in the breakdown of any given function—which breakdown may well turn out to take place in the reverse order from the development of that function in childhood.

The unevenness of functioning from one type of task or situation to another makes classification of subjects as "normal," "intact presenile," "medium presenile" or "deteriorated" somewhat arbitrary. Nevertheless such a classification was made on the basis of the Rorschach response of each subject. The Rorschach test has shown itself (2, 3, 5) useful in making rather clearcut distinction between levels of personality deterioration, both with groups of elderly subjects and in individual subjects over a period of time.

On the basis of the Rorschach response, 7 subjects in the present population were found to fall in the "normal" category, 22 in the "intact presenile," 18 in the "medium presenile" and 13 in "deteriorated." In only two instances did subsequent testing with other tests fail to support this initial classification: two male subjects who were originally classified as medium presenile were later re-classified as intact presenile because of good performance in later tests. This gave final groups of 7 normal subjects, 24 intact preseniles, 16 medium preseniles, and 13 deteriorated.

Table 3 gives data for age and classification of subjects.

All subjects, after being classified on the basis of their Rorschach responses, were given the following battery of preschool and early school-age tests:

1. Cubes: tower of ten, bridge, gate, ten-cube steps
2. Copy forms: circle, square, triangle, rectangle with diagonals, diamond

3. Gesell Incomplete Man test
4. Monroe Visual I
5. Monroe Visual III
6. Wechsler Intelligence Scale for Children (WISC): vocabulary, information, comprehension, arithmetic, similarities, digits
7. Lowenfeld Mosaic Test*

Specific instructions for giving the Gesell Cube tests are given in Gesell et al., "The First Five Years of Life" (11), and in Gesell and Amatruda "Developmental Diagnosis" (12). Materials for the cube tests are ten red wooden one inch cubes. Subject is asked to build a tower of ten and to copy (not imitate) a bridge of three cubes, a gate of five, and a four-step flight of stairs made of ten cubes.

TABLE 3
AGE AND CLASSIFICATION OF SUBJECTS

Category	No. of subjects			Mean age in years		Age range	
	Female	Male	All	Female	Males	Female	Males
Normal	7	0	7	76.28	—	69-81	—
Intact presenile	13	11	24	78.92	82.18	69-85	74-89
Medium presenile	10	6	16	83.90	82.17	71-90	76-91
Deteriorated	5	8	13	84.00	84.37	77-92	78-87
	35	25	60	All 80.00	83.00		

Materials for the Copy Forms tests are simply a circle, cross, square, triangle, rectangle with diagonals, and diamond, inked in black on 8½" by 5½" white cards. Subject is given one card at a time and asked to copy the form on a piece of paper.

Gesell Incomplete Man Test is described both in "First Five Years" (11) and in Ames "The Gesell Incomplete Man Test" (1). Material for this test consists of a letter-size sheet of green paper on which is stamped in black ink the outline of a man having one arm and hand, one leg and foot, one ear, nose and mouth but no eyes; hair on one side of head only, neckline on one side and half a necktie. Subject is asked "What is this?" If he does not name the figure as a "man" or "person" he is told what it is. In either event, he is asked to "finish" the man.

Monroe Visual I and Visual II are described in a leaflet by Marion Monroe entitled "Primary Form Reading Aptitude Tests" (19). Visual I consists of a set of 12 cards on each of which is printed a simple geometric form. Subject is shown these cards, one at a time, and is asked to indicate on a form sheet, for each, which of two forms printed on the sheet resembles the one being shown to him on the card.

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* Except for the Rorschach, the Mosaic is the only test included in this battery which is given to child subjects at all ages from 2 years through 16 years.

Monroe Visual III is a more difficult test. Subject is shown each of four white cards, on each of which are printed in black ink four geometric forms in horizontal alignment. Each card is exposed for 10 seconds. Then subject is asked to copy from memory what he has seen on the card.

Wechsler Intelligence Test for Children is described fully in the manual of that name by David Wechsler, published by the Psychological Corporation (26) and is so familiar to most psychologists that we shall not describe it here.

Lowenfeld Mosaic Test is described fully in "The Lowenfeld Mosaic Test" by Margaret Lowenfeld (17). The test consists of a box of 456 plastic pieces, 1/16 of an inch thick, in five different shapes (square, diamond, triangles—equilateral, right-angled isosceles, and scalene—) and in six different colors (black, green, yellow, red, white and blue). There are 48 squares, 72 equilateral triangles, 96 diamonds, 96 isosceles triangles, and 144 scalene triangles. Subject is presented with this box of pieces, and a white tray covered with a piece of paper. He is shown the different kinds of pieces and is asked to make something with them, on the paper, which is 10¼ by 12⅜ inches in size.

D. Findings

1. *Response to the Individual Tests*

a. Rorschach: Since subjects were originally separated into the several groups on the basis of the Rorschach response, it is not surprising that, as Table 4 indicates, mean figures for Rorschach scores in the several groups show a marked deterioration of response with increasing deterioration of classification category.

Though perhaps the clearest Rorschach clue to level of functioning is found in *qualitative* aspects of the response (5, p. 24ff.), nevertheless rather clearcut distinctions between the groups can be seen, at least for certain scoring variables, in Table 4. Thus number of responses falls off steadily, with a sharp drop in the deteriorated subjects. Number of refusals, conversely, increases steadily. With minor exceptions, all types of movement (human, animal, inanimate) fall off steadily as subjects deteriorate, with human movement response virtually absent in the most deteriorated group. Number of color responses, also, decreases steadily till, again, there is virtually no color in the most deteriorated group. Variety of content, too, drops off with increasing deterioration. An increasing proportion of all responses are global or whole responses.

The percentage of responses determined by form alone increases steadily (except for a drop in intact presenility); and conversely the percentage of correct form fall off sharply. Conspicuous in the most deteriorated group (as earlier in children 5 years of age and younger) is the fact that F% is higher than F + %.

TABLE 4
COMPARATIVE RORSCHACH SCORES
MEAN SCORES

	Normals	Intact preseniles	Medium preseniles	Deteriorated
N	15.43	13.04	11.06	7.00
Refusals	.55	.55	1.59	3.15
M	1.85	1.37	.94	.46
FM	1.00	1.50	.88	.30
m	.71	.96	.69	.15
F(C)	.43	.96	.69	.38
FC	.28	.08	.06	.07
CF	1.00	.46	.69	.31
C	.00	.00	.00	.07
sC	1.14	.56	.72	.46
A%	63.43%	64.58%	51.19%	69.15%
H%	14.43%	17.00%	15.06%	11.22%
No. anatomy R	.43	.41	.25	.61
No. content R	4.40	3.62	3.62	1.91
W%	48.00%	46.46%	48.87%	56.92%
D%	51.43%	47.87%	44.18%	39.38%
Dd%	1.00%	5.66%	6.68%	2.69%
F%	63.57%	58.29%	63.56%	76.00%
F + %	84.86%	85.33%	80.51%	60.04%

b. Gesell Cubes: As Table 5 indicates, all normal subjects and nearly all intact preseniles build correctly the tower of ten, the bridge, gate, and ten-cube steps. Thus this test obviously does not discriminate effectively between these two groups of subjects. However, median presenile subjects do consistently fail to make the ten-cube steps. This failure, therefore, suggests that any subject so failing is below the level of intact presenility. Deteriorated subjects, further, fail all of the cube tests except the tower of ten. Such a failure is one of the clearest indications of deterioration given by the present battery of tests, and any substantial failure in the cube tests appears to be one of the clearest indicators of real deterioration.

c. Gesell Copy Forms: Here again as with the cubes, both normal and intact presenile subjects succeed on all the sub-tests. And though there are occasional failures among the medium preseniles, this group too holds up to the extent that more than half the subjects succeed on all copy forms. Only with deteriorated subjects does this break down to the extent that deteriorated elderly subjects fail both the copy diamond and copy divided rectangle with diagonals. Such a failure supports failure on bridge, gate, and steps as designating marked deterioration.

TABLE 5
COMPARATIVE SCORES ON GESELL TESTS

	Normals (7)	Intact preseniles (24)	Medium preseniles (16)	Deteriorated (13)
Cubes (% Correct):				
Tower	100%	84%	80%	60%
Bridge	100%	94%	86%	36%
Gate	100%	89%	80%	27%
Steps	100%	75%	26%	9%
Gesell Copy Forms (% Correct);				
Circle	100%	100%	68%	77%
Cross	100%	100%	88%	77%
Square	100%	100%	75%	61%
Triangle	100%	96%	75%	53%
Rectangle	100%	100%	62%	23%
Diamond	100%	87%	56%	15%
Visual I				
Mean score	12	10.96	10.20	4.69
Visual III				
Mean score	8.93	2.77	.83	.92
% Correct	47%	35%	10%	4%
Incomplete Man				
Mean no. of parts	8.57	7.87	6.31	3.37
Hair	6/uneven	6/too short	None	None
Eyes	• •	⊙ ⊙	○ ○	None
Ear	Good placement	Variable	Variable	None
Arm				
Placement	OK	OK	OK	OK or none
Length	OK	OK	Too short	Variable /none
Direction	OK	OK	Upward	OK/none
Fingers	OK	OK	OK	None
Leg				
Placement	OK	Too far out	OK	OK
Length	Too short	OK	Too short	Too short
Direction	Too straight	Too straight	Variable	Variable
Neck	Neckline only	Bow	None	None
Parts added:	Arm, finger leg, *foot*, hair, eyes, ears, neck.	Arm, finger, leg, hair, *eyes*, ears, neck	Arm, finger, leg, hair, ear, neck	Arm, leg, + one other

d. Gesell Incomplete Man: As Table 5 indicates, the mean number of parts added to the man by normal elderly subjects is 8.57, which is typical of a 7 year level of response. Intact preseniles add, on the average, 7.87 parts, typical of the 5 year old child's response. Medium preseniles hold up to a mean of 6.31 parts added, but the deteriorated subjects add only a mean of 3.39 parts, a typical 4 year old response.

Differential diagnosis here depends more on qualitative factors (angle, placement and length of arm and leg, number-size-placement of hair, type of eye, etc.) than strictly on such a quantitative consideration as number or nature of parts added. Evaluation of qualitative factors requires considerable familiarity with this test. However, as Table 5 indicates, addition of such basic parts as arm, finger, leg, foot, hair, eyes, ear, and neck suggests that any subject so responding is probably still within the *normal* classification. Foot drops out, but all other basic parts remain in intact presenility. Eyes drop out in the medium presenile group. Response deteriorates almost completely in the so-called deteriorated subjects who add usually only a very poor quality arm, leg, and some one other part.

e. Monroe Visual I: Here again is a test which is relatively easy for normal, intact presenile, and even for medium presenile subjects. As Table 5 shows, even these latter two groups respond correctly to as many as 10 + out of the possible 12 forms. But deteriorated subjects fail this test signally, and thus failure on Visual I supports failure on bridge, gate and steps, and on copy rectangle and diamond in classifying any given subject as deteriorated.

f. Monroe Visual III: Here the breakdown of response comes much earlier. As Table 5 shows clearly, Visual III is one of the most difficult tests in this battery for the present group of subjects. Scores fall off sharply from a mean score for the group of 8.93 among the normal subjects with 47% of responses correct (a response considered adequate at the 8-9 year old age level), to 2.77 with only 35% correct for the intact preseniles (a response characteristic of the 5 year old age level), to .83 with only 10% correct for medium preseniles, and .92 with only 4% correct for deteriorated subjects (response not considered effective for children of any age level).

Thus we consider that normal elderly subjects, though falling short of a completely accurate response, are able to make a creditable response to this test. Not so with intact preseniles. Thus we consider that this test makes a differential diagnosis between normal and intact presenile subjects. Any failure to make a substantially successful response to this test appears to indicate that subject is presenile at best.

g. Lowenfeld Mosaic Test: Developmental study of the child's response to the Mosaic test has shown (4) that as the subject matures, responses "improve" from non-representational products without pattern, through non-representational products *with* pattern, to representational objects and scenes. The present study indicates that with increasing deterioration, elderly subjects, in their Mosaic performance, reverse this order.

Thus, as Table 6 shows clearly, in normal elderly subjects the majority of responses are representational products, or fall in Class C. Among intact presenile subjects, 17% make representational objects, while the majority (62%), construct non-representational designs with pattern. Medium presenile subjects make only 7% representational objects, 46% non-representational designs with pattern, and 40% non-representational designs without pattern. In deteriorated subjects, non-representational designs without pattern clearly predominate (53%).

TABLE 6
LOWENFELD MOSAIC TEST: PERCENTAGE OF PRODUCTS FALLING IN VARIOUS STRUCTURAL CATEGORIES

	Normals (7)	Intact preseniles (24)	Medium preseniles (16)	Deteriorated (13)
Refusals	14%	0	7%	8%
A1. Just drop or pile		0	13%	15%
A2. Scatter singly		4%	0	15%
A3. Prefundamental		12%	13%	23%
A4. "Over-all"		4%	13%	0
All A, or Non-representational without pattern		20%	40%	53%
B1. Fundamental		8%	20%	23%
B2. Central design	28%	54%	26%	15%
All B, or Non-representational with pattern	28%	62%	46%	38%
C1. Object	57%	17%	7%	0
All C, or Representational	57%	17%	7%	0
Successful	71%	50%	40%	15%
Failure	29%	50%	60%	85%

Furthermore, 71% of the products of normal subjects may be considered "successful," but only 50% of those of intact preseniles, 40% of those of medium preseniles, and 15% of those made by deteriorated subjects.

Thus the Mosaic appears to be one of the most discriminative tests in indicating level of performance in elderly subjects. Any response which must be classified as "non-representational without pattern" indicates that subject is presenile or below. Any successful construction of even the simplest object suggests intact presenility or better.

h. Wechsler Intelligence Scale for Children: The following tests from the verbal scale of the WISC were given to all subjects: vocabulary, information, comprehension, arithmetic, similarities, digits. Responses were scored in the standard manner for computing the so-called "raw score." Scaled score figures were obtained from WISC tables for subjects 15^8 to 15^{11} years, since that is the oldest age level covered by the test. However, no effort was made to compute intelligence scores since all subjects were obviously well beyond this age level.

Thus whereas figures obtained are not useful in figuring out I.Q.'s, simply used as flat figures they give a clear indication of the manner in which response deteriorates with increasing deterioration of subjects. Without exception, for both raw scores and scaled scores as well as for the total scale, responses decrease in adequacy and accuracy with increasing deterioration of subjects.

Noteworthy is the relative degree of excellence in the various subtests. Among normal subjects, response to both Vocabulary and Information subtests rates considerably higher (scaled score) than does response to any other sub-test. Intact preseniles, also, make a somewhat better scoring on these two tests than on others. Even the medium preseniles rate somewhat higher on Vocabulary than on other tests. Deteriorated subjects do best on Information and Comprehension. Similarities rates lowest for all groups except the normals and is one of the lowest for normals.

Though a check with Table 7 will thus indicate approximately where, according to our findings, any given level of response to the WISC rates as to intactness or deterioration of performance, the WISC appears to be less useful than other tests in the present battery for determining level of performance in elderly subjects.

2. *Developmental Level of Responses to Various Tests*

A study of Table 8, which indicates the ages in children at which responses of our different groups of subjects to the various tests may be rated, reveals clearly one of the most difficult problems which occurs in the care and treatment of elderly individuals. That is the unevenness of response from one situation to another. Thus as will be seen, presumably normal subjects

TABLE 7
RAW AND SCALED SCORES ON WECHSLER INTELLIGENCE SCALE FOR CHILDREN (WISC)

	Normals (7)	Intact preseniles (24)	Medium preseniles (16)	Deteriorated (13)
Total Scale				
Scaled score	66.75	41.95	29.33	17.31
Vocabulary				
Raw score	67.14	46.83	40.25	16.38
Scaled score	17.14	9.79	7.87	2.23
Information				
Raw score	25.62	18.88	14.83	10.96
Scaled score	16.25	9.55	6.66	4.80
Comprehension				
Raw score	18.25	15.45	11.33	9.07
Scaled score	11.50	8.59	6.33	4.31
Arithmetic				
Raw score	12.25	10.27	8.33	5.46
Scaled score	10.00	7.45	5.33	3.31
Similarities				
Raw score	11.50	8.54	6.53	3.77
Scaled score	10.75	5.67	4.00	1.92
Digits				
Raw score	11.50	9.00	8.14	5.07
Scaled score	10.75	7.50	6.21	3.23

respond on some aspects of some tests as far down as 4 years of age, on others well up to 10 years of age. Intact preseniles range from 3 to 7 years of age in their responses; medium preseniles from 2½ up to 6 years; deteriorated subjects from 2 to 5 years.

In spite of this, there is considerable pattern to the total response in that for each individual test the mean developmental age of response decreases steadily with increasing deterioration of subject. Thus intact presenile subjects, on the average, perform less effectively than do normals, and so on, in spite of the unevenness of performance in any given subject at any time.

3. *Differential Diagnosis*

Findings indicate clearcut and obvious differences between groups of elderly subjects of different degrees of intactness, as tested on the present battery of tests, as follows:

a. Normal elderly subjects respond on all tests in this battery about as would normal adults of any age—succeeding on all cube, copy form, and visual tests as well as making adequate responses to the incomplete man, Mosaic and WISC tests.

TABLE 8

Development Level of Responses to Each Test for Each Group

Normal $N = 7$ Mean age 76.28 years	Intact presenile $N = 24$ Mean age 80.46 years	Medium presenile $N = 16$ Mean age 83.25 years	Deteriorated $N = 13$ Mean age 84.20 years
Rorschach: 15 N (6 years) 1.85 M:1.14 sC (10 years) 64%F/85%F+ (8 years) 4.4 content categories (4½ yrs.)	*Rorschach:* 13 N (3½ years) 1.37 M:.56sC (7 years) 58%F/85%F+ (7 years) 3.6 content categories (3 yrs.)	*Rorschach:* 11 N (2½ years) .94M:.72sC (6 years) 64%F/80%F+ (5½ years) 3.6 content categories (3 yrs.)	*Rorschach:* 7 N (2 years) .46M:.46sC (3½ years) 76%F/60%F+ (3 years) 1.91 content (2 years)
Gesell Cubes: Tower Bridge Gate Steps (5 year +)	*Gesell Cubes:* Tower Bridge Gate Steps (5 years +)	*Gesell Cubes:* Tower Bridge (4 years) Gate	*Gesell Cubes:* Tower (3 years)
Gesell Forms: Circle Cross Square Triangle Rectangle Diamond (6 years +)	*Gesell Forms:* Circle Cross Square Triangle Rectangle Diamond (6 years +)	*Gesell Forms:* Circle Cross Square Triangle Rectangle Diamond (6 years +)	*Gesell Forms:* Circle Cross Square Triangle (5 years)
Visual I: All (5 year +)	*Visual I:* 10.96 (5 years)	*Visual I:* 10.20 (5 years —)	*Visual I:* 4.69 (Unscoreable)
Visual III: 8.93 (8-9 years)	*Visual III:* 2.77 (5 years —)	*Visual III:* .83 (Unscoreable)	*Visual III:* .92 (Unscoreable)
Incomplete Man: 8.57 parts (6 years): Arm, finger, leg, *foot*, ears, neck	*Incomplete Man:* 7.87 parts (4½ years): Arm, finger, leg, hair, *eyes*, ear, neck.	*Incomplete Man:* 6.31 parts (4 years) Arm, *finger*, leg, hair, ear, neck.	*Incomplete Man:* 3.39 parts (3 years) Leg, arm, and one other.
Lowenfeld Mosaic: Patterned designs Objects (6 years +)	*Lowenfeld Mosaic:* Patterned designs (5 yrs.)	*Lowenfeld Mosaic:* Non-patterned designs, patterned designs (4 yrs.)	*Lowenfeld Mosaic:* Non-patterned designs (3 years)
WISC: Score 10-17	*WISC:* Score 5-9	*WISC:* Score 4-7	*WISC:* Score 2-5
*Range of Behavior Ages:** 4½-10 years	*Range of Behavior Ages:* 3-7 years	*Range of Behavior Ages:* 2½-6 years	*Range of Behavior Ages:* 2-5 years

* Omitting the WISC which yields no developmental, or age, designation.

b. Intact presenile elderly subjects respond almost as well, especially on the cube and copy form tests. The foot tends to drop out on the incomplete man, but otherwise the response to this test is good. There may be an occasional error on Visual I. On the Mosaic, objects are less likely to appear and there is the possibility of non-representational designs without pattern. However, the significant clue which distinguishes normal from intact presenile subjects is that the latter can make only the most limited response to Visual III, whereas the former respond adequately.

c. Medium preseniles: Though these subjects can respond adequately to all copy form tests, and make only an occasional error on Visual I, they fail on the ten-cube steps, are unable to respond adequately to Visual III, add neither eyes nor foot to the incomplete man and are much more likely to make non-representational designs without pattern on the Mosaic test than they are to make recognizable objects.

d. Deteriorated subjects: Deterioration shows itself very clearly on the present battery of preschool and school-age tests. Deteriorated subjects can build a tower of 10 cubes, but fail the bridge, gate and steps, They can copy correctly a circle, cross, square and triangle, but not the rectangle with diagonals or the diamond. They fail signally on both Visual I and Visual III, and make only a meagre response to the incomplete man test, adding on the average a leg, arm and one other part. On the Lowenfeld Mosaic they are most likely to make non-representational designs without pattern.

As in other situations, final judgment as to the degree of intactness of function of any given individual is ideally based on response to a group of tests rather than on his response to a single test. However, as indicated above, with only two exceptions in our present group of sixty subjects, classification as to intactness of performance based on the Rorschach response alone was born out by responses to subsequent tests.

4. *Age and Sex*

As various investigators have commented, and as one of our own earlier studies has indicated (5), it is important in any study of behavior of elderly subjects to free oneself from over-concern with chronological age. This because degree of intactness of performance seems in many instances surprisingly unrelated to age in years. Table 3 shows this clearly in that females as old as 81 years of age are found in the so-called "normal" group, females as young as 77 in the deteriorated group. Or men as old as 89 are found in the intact presenile group, those as young as 78 in the deteriorated group.

Nevertheless as Table 3 makes evident, there is a conspicuous tendency, in women subjects especially, for the mean age of each group of subjects to increase with increasing deterioration of function.

As to sex differences, the two groups here (female and male) are not well enough matched to make detailed comparison practical, so that we have not analyzed findings separately for the two sexes.

E. SUMMARY

This study reports an attempt to determine level of intactness of personality and performance in a group of elderly subjects on the basis of their performance on a battery of psychological tests used customarily at the preschool and early school levels. From a practical view, currently available testing techniques have not appeared to furnish differential diagnoses which give a satisfactory indication of what can actually be expected of elderly individuals.

The hypothesis is offered, and apparently confirmed, that in spite of seeming intactness of function (good vocabulary, reasonably good memory, apparent social adequacy) many elderly individuals are functioning, at least in some respects, at what amounts to a preschool level. And that for this reason, preschool and early school-age tests may yield a better indication of exact level of performance and possible function than will the type of adult intelligence and performance test customarily given.

It is further suggested that in order to measure effectively decreasing levels of effective performance in elderly subjects, the clinician needs to understand the succeeding steps in the breakdown of any given function, which may well turn out to be the reverse of the development of that function in childhood.

Subjects for the present study were 100 guests of the Masonic Home in Wallingford, Connecticut, who were each given a Rorschach test. From this initial group of 100 subjects, 60 were chosen for further testing, not on the basis of degree of psychological intactness or deterioration but merely on the grounds of willingness, cooperativeness and enough visual and auditory acuity to make further participation in the study practical. On the basis of the Rorschach, 7 subjects were classified as normal; 24 as intact presenile; 16 as medium presenile; 13 as deteriorated. Mean ages for these several groups were 76.28 years; 80.46 years; 83.25 years, and 84.20 years, though total range in age of individual subjects was from 69 to 92. In all, 35 female and 25 male subjects were tested. All levels of social status and ability were included in this group though those of the higher levels were overly represented in comparison with the total U.S. population.

After subjects were classified as normal, intact presenile, medium presenile

or deteriorated on the basis of Rorschach performance, they were given the battery of tests indicated below. Mean scores for each group of subjects on each of these individual tests support the classification made on the basis of the Rorschach alone and indicate clearcut differences between the different groups as follows:

a. Gesell Cubes: Normal and intact subjects succeed on all cube tests; medium preseniles fail only steps; deteriorated subjects fail all but the tower of ten.

b. Gesell Copy Forms: Only with deteriorated subjects is there any conspicuous failure here. Deteriorated subjects fail on diamond and divided rectangle.

c. Gesell Incomplete Man: This test appears to give good clues as to level of intactness, but considerations here are largely qualitative and require some skill in test interpretation. However, normal subjects do add all necessary parts; deteriorated subjects add usually only a very poor quality arm, leg and some one other part.

d. Monroe Visual I: Only deteriorated subjects show any conspicuous inability to deal with this test effectively. Thus failure on Visual I supports failure on bridge, gate and steps, and on copy rectangle and diamond in classifying any given subject as deteriorated.

e. Monroe Visual III: Here the breakdown of response comes much earlier. Though normal subjects have a mean score of 8.93 (which equals the performance of the average 8-9 year old child), intact preseniles give a mean score of only 2.77 and medium preseniles a score of only .83. Thus any failure to make a substantially successful response to this test appears to indicate that subject is presenile at best.

f. Lowenfeld Mosaic Test: Here any response which must be classified as "non-representational without pattern" indicates that subject is presenile or below. Successful construction of even the simplest object indicates intact presenility or better.

g. WISC: Scores for tests in this battery cannot be converted either into I.Q. scores or developmental ratings for elderly subjects, but there is a gradual and consistent falling off of both raw and scaled scores with increasing deterioration of subjects. However, the WISC appears to be less useful than other tests in the present battery for determining level of function in elderly subjects. Vocabulary and information tests appear to be particularly deceptive in indicating a spuriously high level of performance.

These findings appear to confirm the suggested hypothesis that preschool and school age tests do permit an adequate differential diagnosis between groups of normal, intact presenile, medium presenile and deteriorated subjects.

Range of behavior ages on individual tests in this battery is: 4½ to 10 years for normal subjects, 3-7 years for intact preseniles, 2½-6 years for medium preseniles, and 2-5 years for deteriorated subjects.

Degree of intactness of function appears to be largely independent of chronological age of subjects. Clearcut sex differences are not evident.

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The Journal of Genetic Psychology, 1962, **100**, 41-46.

THE PSYCHOLOGICAL, EDUCATIONAL, AND SOCIAL PROBLEMS OF THE AGING AS VIEWED BY A MID-OCTOGENARIAN*

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A. SOME PERTINENT FACTS TO BEAR IN MIND IN CONNECTION WITH THE EDUCATIONAL, PSYCHOLOGICAL, AND SOCIAL ADJUSTMENT OF THE AGED

Every individual is confronted with the problem of continuous adjustment to the biological, psychological, and social changes that go on continuously from birth to death.

These changes, whether normal or abnormal, vary more or less with each individual throughout the life span, and call for individual adjustments. The doctrine of individualization of the program of educational, psychological, and social adjustment is just as important for oldsters as for youngsters, in fact even more important, except perhaps during the period of early dependency, because of the variations that occur with the accumulation of experience with growing maturity. Old people should not be treated collectively as a unitary group or amorphous mass, but individually as unique persons who vary greatly in their capacities, potentials, aspirations, and needs.

The process of aging entails many deteriorative changes in basic cell structure, in visual and auditory acuity, in muscular strength, agility, and coordination, in retentiveness, in intellectual acumen, and in many other functions. But most of these losses are not incapacitating, and many or most can be prevented or mitigated by proper medical treatment and activity programs involving the use of various functions in intellectual, educational, social, and occupational pursuits. The distinguished psychologist, William James, said that we become "old fogies" at 25. But research has shown that old fogies among the humans can learn "new tricks" even in the seventies or eighties or even later if properly motivated.

The public image of the oldster as an irritable, cantankerous, crochety, eccentric individual, who is narrowminded, rigid, inept, amnestic, disruptive,

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* Received in the Editorial Office on November 25, 1960, and given prior publication in accordance with our policy regarding manuscripts on the subject of aging.

deteriorated, and decrepit needs to be revised. It is true that about 33 per cent of patients in mental hospitals are over 65, while 27 per cent of first admissions to such hospitals are over 65. Many of the other oldsters at large are subject to minor maladjustments which are often produced by the frustrations to which they are subjected, such as: loss of jobs, loss of friends and relatives, financial and health worries, social discrimination, social isolation, being snubbed, "cold shouldered," ignored, belittled, or treated with disrespect, and the bleak hopelessness of a purposeless, unproductive future. Many of the ugly personality traits of the aged are socially produced and are amendable to preventive and reconstructive mental hygiene and educational treatment.

There is no abrupt loss of ability or competency at 65, or 70, or any other chronological age limit justifying involuntary, automatic retirement of everybody at the same arbitrary age. The prevalent inelastic, automatic retirement systems are arbitrary and unscientific and impose great injustice on many well-adjusted, competent workers on all levels of skill, who are relegated to a rocking-chair existence or thrown on society's human scrap pile to rot in frustrated inactivity. Some workers should be retired at 50 or 55, for their own good or for the protection of society against incompetents, and others at 80 or even later. There will be far more in this age group in the future than in the past with constantly lengthened longevity. There are now an estimated 15,000,000 people in the country over the age of 65. That number may be 20,000,000 within the next quarter century. So the problem is growing more challenging, not less.

The vast majority of the aged over 65 live in their own homes or the homes of near relatives or friends rather than in institutions. The exact number in all kinds of institutions, in all kinds of hospitals, and nursing, rest, and old folks homes is not known, but it probably does not exceed 10 per cent of the oldsters. Whether they are better off, psychologically and socially considered, in their own homes or in the homes of relatives, than in congregate institutions is in need of scientific determination. But as of now programs of habilitation or rehabilitation of whatever nature must reach these people in the homes where they live or in community establishments near their homes.

Aside from medical treatment for diseased conditions, the pivotal therapy of the aged is activity rather than inactivity. The "rest cure" may be appropriate for some of the sick and neurasthenic, whether young or old, but it is not the prescription for the general run of the aged. Their salvation lies in keeping busy. The best form of activity therapy for them is creative work rather than recreation, however valuable the latter may be. And there is no suggestion here to minimize its importance. Nevertheless, work therapy possesses unique value as a unifying, integrative, objectifying, rejuvenating force. It gives direction and purpose to existence. It provides dynamic motivation through interest-arousing achievements of economic worth. It prevents stagnation and deterioration. It tends to overcome the disintegrative tendency that springs from lack of concentration or dispersion of attention. It gives a sense of participation, economic worth, and social dignity. It generates feelings of self-confidence, self-respect and security.

The work therapy concept predicates job placement in suitable jobs for remuneration. Investigations show that a large majority of retirants are retired against their will and the majority of such eliminees are capable of continuing successfully at work. Thus 40 to 60 per cent of thousands of prospective retirees in 47 large industrial concerns indicated that they wanted to continue work after 65, according to the report of the National Committee on Aging (1959). In the Hagerstown, Maryland, 1958, investigation of the general population over 45, 63 per cent of those polled felt that "generally speaking, retirement is bad for a person." Many employers with flexible retirement plans permit from 50 to 80 per cent of their employees over 65 to remain on the job. In a recent investigation (1959) by many personnel directors in a large number of companies with fixed retirement ages the conclusion was reached that from two-thirds to three-fourths could have continued to work. In an Arkansas investigation (1957) it was found that 90 per cent of 1200 hard-to-place oldsters could be successfully reemployed through a program of retraining. Many colleges are now calling back into service retired instructors because of the shortage of teachers. It is incontestable that millions of workers have been "fired" from their jobs without "rhyme or reason."

Inflexible retirement laws and regulations at an arbitrary chronological age should be humanized in accordance with scientific findings. Retirement should be individualized to meet the individual needs of the prospective retirees. Retirement systems should permit gradual or staggered retirement for all who retain their skills and desire to remain at work. Competent workers should be afforded the opportunities to continue on a diminishing schedule or terminate their employment abruptly, as they prefer. In this day of critical manpower shortage, and the high cost of training skilled workers, society cannot afford not to avail itself of these skills, mature judgment, insight and understanding of the older experienced workers.

With respect to inflexible retirement systems, the Government itself is one of the worst offenders, nor does it provide part-time employment except in certain temporary consultation jobs. It is true that it has withdrawn age limits from many technical or professional jobs, but it allows state and local agencies to impose rigid age restrictions on positions partly or largely supported by Federal grants. Discrimination by these agencies solely on the basis of chronological age is now rampant throughout the country, and will probably continue unless Government financial support is withdrawn from all local agencies which discriminate against any qualified applicant merely because of age. Legislation should be passed which will enforce this requirement. Let us not forget that society at present is losing the contributions of thousands of willing and capable workers on the professional level alone because of our arbitrary and stupid retirement systems. It is better for society and for the individuals concerned to permit oldsters to wear out rather than to rust out.

The educational program is multiphase in character, involving educational, psychological, mental hygiene, and social factors which cannot be sharply separated. A comprehensive program would include at least the following: (*a*) the maintenance of physical health and vigor; (*b*) the preservation of the power of mental adjustment, mental health and resilience, and the prevention or remediation of mental deterioration, maladjustments, and disease; (*c*) the preservation, habilitation, or redirection of educational skills and the updating of understanding and information; (*d*) the preservation of social skills and the safeguarding of social amenities, privileges, rights, status, and security; (*e*) the maintenance of occupational efficiency, privileges and rights and the guarantee of work opportunities and economic security; and (*f*) the education of the community with respect to all these objectives and the obtaining of the legislation and the drafting of the regulations needed to instrument the programs for the conservation of the manpower of our "Senior Citizens."

B. Ruthlessness of Present Policies Toward the Aged

1. Enforced retirement at an arbitrary age irrespective of the retiree's condition.

2. Widespread discrimination against a segment of the population because of age: (*a*) they have been denied work opportunities and thrown on the scrap heap of inactivity as socio-economic liabilities irrespective of their fitness; (*b*) they have often been discriminated against socially; they have been set apart, ignored, or denied recognition in spite of their wealth of experience or the contributions they have made. They have been made to feel that they are not wanted, to be shunted aside as so much excess baggage; and (*c*) many have been made to feel that they are dependents because of the inadequacy of the social security grants.

C. What do the Senior Citizens Want?

1. They want some voice as to when they need to be retired. They are against involuntary, automatic retirement at an arbitrary age, purely because of age.

2. Most want to continue in productive employment either in their old jobs or in some other jobs better suited to their psychophysical condition. They feel they have much to contribute to the workaday world and don't want to be reduced to a state of impotence, to spend their lives in bleak hopelessness in a purposeless existence.

3. They want recreational opportunities as a supplement but not as a substitute for work opportunities. Activity is the key word to the preservation of the mental and physical health of the aged. Interesting, creative work is more valuable than recreation as a stabilizing, motivating, integrating force that gives meaning, direction, and dignity to life.

4. They want to keep mentally and physically fit through work therapy and needed medical treatment.

5. They want the services that will make it possible for them to lead an independent existence so far as possible out in society rather than in institutions. They want to remain a part of the community. About 90% of them now live in the community.

D. Recommendations

1. Revamp the retirement acts. Make them more flexible. Abolish fixed, arbitrary age criteria. Relate them to the psychophysical condition and needs of the prospective retirant.

2. Forbid discrimination against workers of any level of skill merely because of age—provided they remain vocationally competent.

3. Provide opportunities for selective vocational training, retraining and updating of fit retirees who want such services—in craft shops, in sheltered workshops, in factories, in industries, in commercial establishments, in hospitals, etc. All such training should be individualized to meet individual needs.

4. Provide selective job placement in existing commercial, occupational, or governmental agencies, or in sheltered workshops. This type of service would, of course, be for those who want it and who have been rendered occupationally fit.

5. Provide educational opportunities in refresher courses for the updating and adjustment of the applicants to the changes constantly taking place in the intellectual, cultural, and social life of the community—available for those who want them.

6. Provide recreational facilities adapted to the varying needs of the aged.

7. Let the programs be organized and administered by existing publicity supported departments, such as the vocational rehabilitation division, the adult education department, and the Federal-State employment service—with the solicited cooperation of industrial and commercial establishments, public and private welfare agencies, and public spirited individuals.

8. As a means of meeting the teacher shortage in Delaware, permit teachers on all levels to return to the service on interim appointments, provided they have retained their intellectual and physical efficiency. Under present statutes school appointees can return for a 60-day stint.

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The Journal of Genetic Psychology, 1962, **100**, 47-53.

INTERFERENCE EFFECTS OF STROOP COLOR-WORD TEST IN CHILDHOOD, ADULTHOOD, AND AGING*[1]

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A. PURPOSE

The capacity of an individual to maintain a uniform course of action independent of intruding or interfering stimuli represents an important aspect of the functioning of the mature organism.[2] The present study is devoted to uncovering differences on this aspect of behavioral functioning during ontogenesis and in old age. The test situation used to investigate this problem is a modified form of the Stroop color-word test. We make the assumption that performance on the Stroop test reflects the capacity to maintain a course of action in the face of intrusion by other stimuli.[3] This critical part of the test involves interference between color naming and word reading. In this situation a color-word, such as "red," is printed in a color, e.g., green, different from the color word. The *S* has the task of naming the color of the ink (green) rather than pronouncing the word (red). Thus, a highly automatized activity (reading color-words) conflicts with the naming of a perceptual property (color). We assume then that carrying out the task of naming colors requires that the two functions (word reading and color naming) are differentiated from each other and, further, that word reading does not interfere, i.e., remain subordinate to color naming.

The basis for this analysis is grounded in a comparative-developmental framework, the most general principle of which states that development entails an increase in differentiation and hierarchic integration of functions. Application of this principle in the present study enables us to make certain predictions for the comparison of various groups. Given the assumption that less

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* Received in the Editorial Office on December 22, 1960, and given prior publication in accordance with our policy regarding manuscripts on the subject of aging.

[1] This investigation was supported by a research grant M-348 from the National Institute of Mental Health, of the National Institutes of Health, Public Health Service.

[2] Some psychologists have handled aspects of this problem in terms of the concept of "set" (cf. 1, 3).

[3] It should be noted that other interpretations have been given by other investigators. For example, Klein (5) assumes that various measures derived from the test reflect "cognitive style or control." Similar interpretations are offered by such investigators as Lazarus (7) and Holtzman, Gardner and Siegel (4).

mature organisms, children, are characterized by lesser differentiation and integration of function, we would expect that they would be less capable of successful performance on the Stroop test than adults. Similarly, if one views old age as involving a "regression" to a less differentiated and hierarchically integrated state, then less adequate performance should show up again at later ages.

B. METHOD

The modified Stroop test used in this study consisted of three kinds of material, printed on 9¼″ × 9¼″ cards, which *S* is instructed to read aloud as rapidly as possible. The first card (A) consists of 100 color words (RED, BLUE, and GREEN) which are printed in black ink and arranged in random order. The task is to read the words as quickly as possible. The second card (B) consists of 100 rectangular patches, 5/16 of an inch × 2/16 of an inch, of color (red, blue, and green) which are also arranged in random order. The task here is to correctly name the colors as fast as possible. The third card (C) presents, again in random order, 100 color-words (RED, BLUE, and GREEN) but these are printed in an ink whose actual color is different from the color designated by the word; e.g., the word "BLUE" might be printed in red ink, the word "GREEN" printed in blue ink, etc. On this card, the task is to name the color of the ink in which the word is printed as quickly as possible. The 100 items on each card comprised 10 lines with 10 items to a line. There is an additional practice line at the top of the page.

The three cards comprising the test were administered in the standard order—Card A, Card B, and Card C. The measure utilized was the total time taken for responding to the 100 items on each card.

C. SUBJECTS

A total of 235 *S*s ranging from seven to 80 years of age were used.[4] The subjects were divided into 11 age groups as shown in Table 1. *S*s from ages seven to 13 were drawn from a grammar school; the 17-19-year-old subjects were undergraduate students; age groups 25-34 and 35-44 were drawn from an evening college; and the age group 65-80 were drawn from a community old age club.

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[4] The lower age limit was set at 7 years of age because after preliminary testing of 5 and 6 year olds it was found that their reading activity was not sufficiently established as an automatized activity to serve as a potent factor of interference (also cf. 9).

TABLE 1

	Age										
	7	8	9	10	11	12	13	17-19	25-34	35-44	65-80
Number of subjects	24	20	20	25	29	25	29	18	14	16	15

D. RESULTS

The over-all results are presented graphically in Figure 1. The graph plots the mean total time in seconds for each of the three cards for the various age groups. As expected the response time is least for reading color-words (Card A), longer for naming actual colors (Card B) and longest when there is interference (Card C); this general relationship holds for all the age groups studied here. However, in keeping with the main hypothesis of the study, the degree of interference differs depending on the age group; here, the pertinent measure for the interference effect is the difference in response time to Card C as compared to Card B. This time difference is greatest with the 7 year olds,

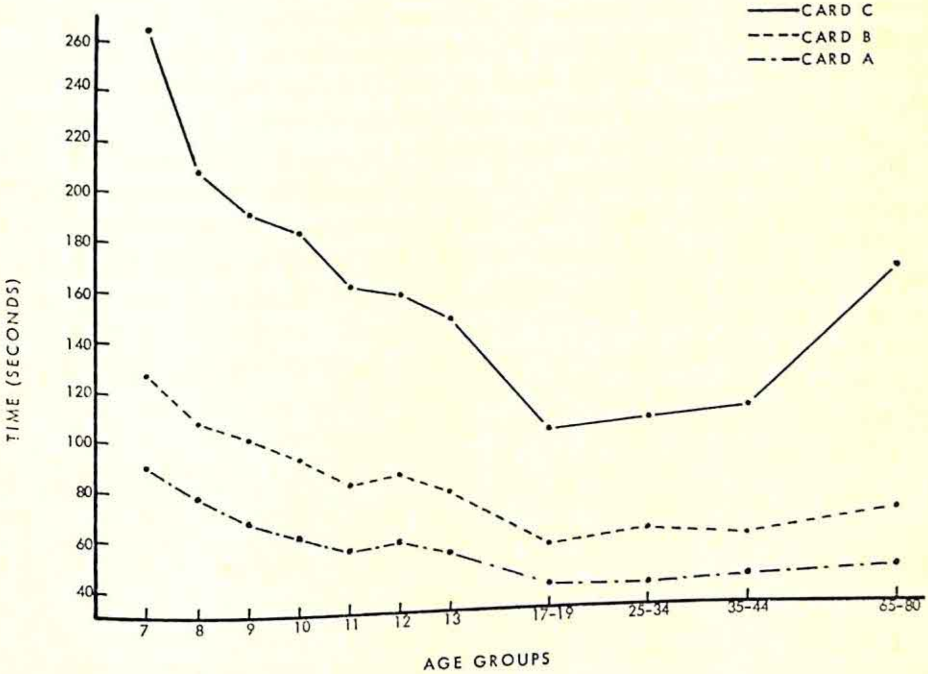

FIGURE 1
CHANGES IN PERFORMANCE ON STROOP COLOR-WORD TEST FROM SEVEN TO 80 YEARS OF AGE.

decreases with increasing age up to the 17-19-year-old level, remains constant during middle years (25 to 45) and then increases again in the older group (65-80). This developmental change is statistically significant; as shown in Table 2 the interaction A × C (age by cards) is significant beyond the .01 level of confidence.[5] Another finding, independent of interference effects, pertains to Cards A and B: the response time for both activities, reading color-words and naming colors, is greatest for the younger age group, decreases with increasing age up to the 17-19 year olds, then remains relatively constant.[6]

TABLE 2
CHANGES IN PERFORMANCE ON STROOP COLOR-WORD TEST FROM SEVEN TO 80 YEARS OF AGE

Source of variation	F-tests df	Mean square	F	P
Between Subjects (S)	234	3381.11	—	—
Between Age Levels (A)	10	49616.21	37.67	<.01
Between *S*s within As	224	1317.05	—	
Within Subjects	470	3844.28	—	—
Between Cards (C)	2	750034.74	1886.60	<.01
A × C	20	6431.89	16.18	<.01
Pooled *S*s × C	448	397.56	—	
Total	704	3690.33	—	—

Mean Time (seconds)

	Age Groups 7	8	9	10	11	12	13	17-19	25-34	35-44	65-80
Card A	89.8	77.6	68.5	62.3	55.6	59.3	54.1	40.5	39.4	42.6	45.1
Card B	126.9	108.3	100.9	92.8	82.1	86.4	79.5	56.1	60.9	57.9	68.9
Card C	264.7	208.3	191.4	184.3	160.8	157.9	147.6	103.0	106.2	109.9	165.1

E. DISCUSSION

In regard to the main problem of this study, i.e., ontogenetic changes in degree of interference of color words on color naming, the following finding was obtained: interference is greatest with young children, decreases with increasing age to adulthood and increases again with older age.

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[5] Because of inhomogeneity of variance between age groups a non-parametric test of significance was also employed in evaluating differences between age levels. A Median Test employing difference scores (Card C—Card B) as the measure of interference showed the proportion of cases above and below median to differ significantly among age groups. In addition it may be noted that an analysis of variance employing ratio scores (Card C/Card B) as the measure of interference also showed significant differences between age groups. In both supplementary analyses the same general finding obtained: there is a decrease in interference effects from childhood to adulthood with an increase in old age.

[6] In the data obtained here as well as by other investigators (e.g., 8, 10) time to respond to Card A (reading color-words) is faster than time to respond to Card B (naming colors) from which we may assume that response to color is less dominant.

As indicated in the introduction, these age changes may be interpreted in terms of comparative developmental theory which formally analyzes such changes in terms of increase of differentiation and hierarchic integration. With respect to differentiation the Stroop task is predicated on the assumption that the two functions, word reading and color naming, are differentiated from each other; with respect to hierarchic integration the assumption is that word reading remain subordinate to color naming. This capacity to maintain color naming in the face of a tendency towards word reading is manifested by more rapid performance on the interference card. Developmentally, children are characterized by lesser differentiation and hierarchic integration of function (13); thus, our finding that children perform less efficiently on the interference task is in keeping with this conceptualization.

As to the oldest age group, 65-80, we have seen that the interference effect is increased again in comparison to the middle age adults. In this case, the developmental notion of "regression" may be employed for formally conceptualizing their behavior on the Stroop test; that is, "regression" implies a *decrease* in differentiation and hierarchic integration of functions. Such a notion has also been of value in studies concerned with psychopathology and drugs. For instance, on the assumption that schizophrenics represent a developmentally less mature group and that the pharmacological drug LSD-25 induces more primitive behavior, it has been demonstrated that on the Stroop test schizophrenics show differentially greater interference effects than normals; and that both normals and schizophrenics show greater interference effects under conditions of LSD as compared to placebo (11).

In order to show the significance of setting these facts within the conceptualization of regression we may point to other perceptual studies on old age where the interpretation of regression in terms of de-differentiation and de-hierarchization has proven to be fruitful. In one study dealing with the perception of verticality striking differences in effect of body tilt depending on age level were found: children (6-15) were found to locate the apparent vertical to the same side as body tilt whereas adults of middle age (18-50) located the apparent vertical to the opposite side of body tilt and older adults (65-80) again located the apparent vertical to the same side of body tilt (2). In another study parallel trends in development were found with two illusions: children and older adults showed greater susceptibility to the Muller-Lyer illusion than middle age groups and similarly children and older adults showed lesser susceptibility to the Titchener Circles illusion than middle age groups (12). In both studies the findings concerning the old age groups were interpreted in terms of a decrease in differentiation; one in terms of lack of differentiation between self and object, the other in terms of lack of differentiation between part-whole relationships. Thus, the present study together with those mentioned point to the developmental notion of "regression" as of heuristic value in formally tying to the behavior of children such varied behavior as occurs in psychopathology, under drugs, and in the course of aging.

Lest the formal similarity between children and older adults be misunderstood, a word of caution may be added here. Although it has been demonstrated that achievements in terms of a time score for children and aged are similar, it should not be implied that the underlying operations leading to their achievements are identical. Some observations suggest that the means by which these achievements are reached differ in these two age groups. Thus, it was frequently observed that younger children in trying to maintain the task on Card C do so by pointing and rhythmically accentuating the material. In contrast to this concrete pointing the aged group sometimes utilized verbal "pointing," i.e., the *S* would precede each response with "that's a —," and in other cases *S* was verbally reminding himself of the task. This indicates the necessity of further investigation in terms of a process analysis rather than simply in terms of achievements.

F. SUMMARY

The present study is devoted to uncovering differences during ontogenesis and in the process of aging concerning the capacity of an individual to maintain a uniform course of action independent of interfering stimuli. The test situation used to investigate this problem is a modified form of the Stroop color-word test. The critical part of this test involves interference of word reading with color naming.

The Stroop test was administered to a total of 235 *S*s ranging from seven to 80 years of age. It was found that the degree of interference of color-words on color naming is greatest with young children, decreases with increasing age to adulthood and increases again with older ages. These changes with age are interpreted in terms of comparative developmental theory.

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JEWISH SUBCULTURE AND WAIS PERFORMANCE AMONG JEWISH AGED*[1]

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A. Introduction

During 1958-59, we embarked upon a study of the intellectual abilities of the aged attending New York City day centers. Among the various subcultural groups studied, we were particularly interested in Jewish subjects, the vast majority of whom were orthodox, to whom the WAIS battery was administered.

No previous data on this problem was available, so far as we were able to determine. The only studies reported in the literature which had any bearing upon our undertaking were those relating to students at Yeshiva day schools and Yeshiva College students, showing them to have significantly higher verbal than performance IQs (Levinson, 1959). Another relevant report on preschool children from traditional homes showed a higher WISC IQ for the boys than for the girls (Levinson, 1960).

Almost all intelligence studies of Jewish subjects show higher verbal skills among this group; a fact commonly attributed to the forces operating within the Jewish subculture. Consequently, it was our expectation that aged Jews would present similar deviations as their younger counterparts.

The pressure of his subculture, upon the Jew, we assume, operates as long as the Jew lives. On the basis of the above, we would expect the psychometric pattern of the Jewish aged to show the effect of: (*a*) the general cultural norms; (*b*) the subculture in which each one lived; and (*c*) the general effect of sex.

We would, therefore, hypothesize that, among the Jewish aged, there would be a higher verbal than performance IQ; that within the group the IQs will be hierarchical, arranging themselves in accordance with nativity and socio-

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* Received in the Editorial Office on December 23, 1960, and given prior publication in accordance with our policy regarding manuscripts on the subject of aging.

[1] The investigator wishes to express his appreciation to Harry Levine, Consultant on Aging, New York City Department of Welfare, and Benjamin Nelson, Case Supervisor of Bureau of Social Services, New York City Department of Welfare, for their cooperation in making this study possible. The investigator also wishes to thank Mrs. Madeline Greenberg, who has done the statistical computations.

economic background; and that there would be a difference in the intelligence of the sexes, or at least a different psychometric pattern.

The main problem of this study resolved itself eventually into one of trying to disentangle the effect of a common cultural environment from that of the subculture since both simultaneously and dynamically affect the same individual. There is a reciprocal priority of causes operating here. It would have been more conclusive, if possible, to follow an experimental group from adolescence through maturity and old age and compare the psychological variables with a "normal" group from the dominant culture. Such a study would be based on an assumption that the psychological variables measured had not changed with time and that the tests themselves were equally reliable and valid regardless of age. Since it is not feasible for such a study to be carried out, we will confine ourselves to a comparison of the test performance of aged Jewish men and women.

Our basic assumption is that any psychometric data for our group which parallels already known trends, such as experimental findings for the general population, is to be ascribed to the effect of the general culture. Similarly, we postulated that atypical findings in our study which coincide with atypical findings for subcultural groups, should be ascribed to the effect of subcultural influences.

B. Problem

The task which we therefore faced, was to try to throw some light on the problems listed below, upon which the execution of this study pivoted, namely:

1. What are the performance and verbal abilities of the Jewish aged men and women?

2. What influence does socio-economic background have on verbal and performance ability of this group?

3. What influence does educational status have on verbal and performance ability for this group?

4. What effect does foreign birth have on the verbal and performance ability of this group?

5. What effect does sex have on the constellation of verbal and performance ability for this group?

C. Procedure

Since the purpose of this investigation was to evaluate intellectual ability in the light of subcultural status, particular care was exercised in securing a sample of active aged Jews who either lived alone or with families and who participated actively in the affairs of their community. It was decided, therefore, to contact the Department of Welfare day centers. Through this agency we obtained for examination 216 subjects who were active participants in the day centers operated by the Department of Welfare, and who were willing to take the WAIS (Wechsler, 1958). The sampling was as follows: 122 foreign born men; 70 foreign born women; 12 native born men and 12 native born women. As far as we could ascertain, there had been no incidence of psychiatric illness among them.

Since attendance at day centers is voluntary, one cannot say how representative these subjects were of the over-all aged Jewish population. We do feel, however, that we had a reliable sampling of the Jewish participants in the day centers for the aged. In considering our findings, we were aware of the fact that the sample may not be equally as representative of aged men as of aged women. Educational, personality and intellectual factors may bring about a differential in the attendance of men and women.

We do not claim that our sample is representative of all Jewish aged in New York City because we simply don't know whether this is so. This is one of the difficulties implicit in any study of the aged. Nevertheless, cognizant of this possible flaw, we went ahead with the research project because of the importance we attached to the various problems upon which it might throw some light. An additional cogent reason for making this study is the fact that our sample consists of aged orthodox Jewish men and women who are either foreign born or first generation, a group that strongly reflects the values of the Jewish subculture and which will become extinct. It is most important to study them while they are with us and to learn as much as we can from them.

We do not know how powerful was the subcultural pull in the lives of our 216 aged subjects. The vast majority, according to the best information we could obtain, were engulfed in the deviant culture during their entire lives. Even when they went to work, their occupations generally kept them among Jews. We do not know to what extent their social and behavioral group affiliations were also confined to their subculture, but we can hazard a guess that in all likelihood these phases of living were also largely within Jewish frameworks. In other words, the extent of acculturation cannot be measured accurately.

Besides the other artifacts which may have interfered with our securing an unbiased sample, one must consider the differential death rate. Men die earlier than women (Jones, 1959). We know that it is usually the sicker, the weaker, the person of the lower occupational level, and presumably the duller, who dies first. Therefore, in considering these results, one must think of the fact that we are comparing two samples of continually changing populations, the differential mortality of which *per se* would bring about different psychometric patterns between the groups.

To each subject, the examiner explained that he was a member of a team of Yeshiva University graduate students making a research study of the special abilities of the aged in order to improve day care center facilities for the aged. Before taking the test, the subjects were asked to express any grievances or misgivings about the day center, or anything else pressing on their mind. In many instances, when fatigue or other factors made it necessary, the test was given in two administrations. In some cases, the subjects were unable to complete the entire WAIS battery. When this occurred, only those scores were reported which the examiners considered valid.

D. Results

The average age of the group was 69.43 with an SD of 6.73. The range in age was from 60 to 85. The mean WAIS full scale IQ was 96.04 with an SD of 15.94. This is below that of the average of the general population. This was a surprising development in view of the fact that the majority of the previous studies have produced a mean Jewish IQ at least as high, if not higher, than that of the average of the population. Three possible explanations presented themselves: (*a*) that the WAIS was not an adequate measure of the intelligence of the aged Jews because of their foreign language background; (*b*) that the WAIS did not measure the skills and know-how, which are a mark of ability in this group; and (*c*) that possibly the socioeconomic background and nativity of these subjects militated against their getting higher IQs.

The mean verbal IQ is 99.27; the mean performance IQ is 91.56; with a difference of 7.71 which is significant beyond the .01 level of confidence. The superiority of verbal as against performance ability in these subjects confirms previous studies of Jewish subjects but is surprising for these aged since most of them have engaged in manual occupations. Perhaps the fact that most of these aged have been immersed from babyhood in the Jewish subculture, with its emphasis on verbal values and relative neglect of performance arts, served to depress performance IQs. Possibly, also, the WAIS norms at these ages don't fully reflect the actual patterning of verbal and performance abilities.

E. Nativity

We may note that the native born sample is much younger than the foreign born sample. The native born mean age is 66.58, the foreign born mean age is 69.77. The difference of 3.19 is statistically significant. It thus appears that selective factors have operated in bringing native born as opposed to foreign born to the day centers.

Table 1 shows that there is a statistically significant difference between the intelligence of the native born and foreign born Jews. This goes along with studies found in other population groups (Arsenian, 1945; Levinson, 1957). However, the verbal IQ is higher than the performance IQ for both native and foreign born subjects. This is not a typical finding. Altus (1955), for example, found that the verbal IQ of the Wechsler Intelligence Scale for children was significantly lower than the performance IQ in bilingual Mexican children.

We may note that the intelligence of the native born Jew is high average. However, it is not as high as found in the studies of Jewish children of traditional parentage (Nardi, 1944; Levinson, 1957). Possibly intelligence is a selective factor in our sampling since we can possibly assume that the more intelligent plan and provide for their old age so that they do not become participants in day centers. Possibly those of higher intelligence, even of the same financial circumstances as the day center subjects maintain intellectual interests and are able to pursue activities more to their liking elsewhere.

Since our native born sample is atypical both in terms of age and intelligence as compared to our foreign born sample and possibly also in terms of subcultural influences, we decided to eliminate them from further consideration of our findings.

F. Occupation

We may note that the former occupations of our foreign born subjects are atypical for the current Jewish New York City population. Since our group is foreign born it may be valid for the group under consideration and may represent Jewish occupational distribution within certain neighborhoods a generation ago. An examination of the data reported in Seligman (p. 101) regarding recent occupational distribution of male Jews in New York City (we cannot compare females since the ratios of Jewish women employed in industry have been steadily increasing) discloses that 62.5 per cent of Jewish males are employed in professional and semi-professional work, or as proprietors and managers, or in the clerical and sales fields, as against 41.1 per cent in our sample.

An examination of Table 2 further discloses the fact that the variation in intelligence of the foreign born Jews hinges upon socio-economic background and occupation in a pattern corresponding to the other studies which indicated a correlation between IQ and socio-economic backgrounds (Simon and

Levitt, 1950). However, we also discover that the verbal IQ is higher than the performance IQ at every occupational level except for the unknown category, where, for the men, the performance IQ is higher than the verbal IQ. This is contrary to previous studies which indicated some relationship between socio-economic background and verbal and performance tests (Wechsler, 1958, p. 160).

TABLE 2
INTELLIGENCE OF FOREIGN BORN JEWS ACCORDING TO FORMER OCCUPATION

		WAIS Full			WAIS Verbal			WAIS Performance		
Occupation	Sex	N	%	IQ	N	%	IQ	N	%	IQ
Professional and Semi-professional	Men	13	10.7	115.69	13	9.9	120.08	13	10.7	108.38
	Women	2	2.9	109.00	2	2.9	111.00	2	2.7	105.00
	Men & Women	15	7.8	114.80	15	7.4	118.87	15	7.8	107.83
Proprietors and Managers	Men	19	15.6	100.42	20	15.2	106.25	19	15.6	93.11
	Women	6	8.6	98.32	6	8.6	101.33	6	8.6	96.50
	Men & Women	25	13.0	99.89	26	12.9	105.12	25	13.0	93.92
Clerical and Sales	Men	18	14.8	100.06	21	15.9	104.05	18	14.8	93.67
	Women	6	8.6	99.00	6	8.6	104.33	6	8.6	91.50
	Men & Women	24	12.5	99.79	27	13.4	104.11	24	12.5	93.13
Craftsmen and Operatives	Men	63	51.6	93.22	67	50.8	95.57	63	51.6	90.62
	Women	21	30.0	90.10	21	30.0	93.76	21	30.0	86.38
	Men & Women	84	43.8	92.44	88	43.6	95.14	84	43.8	85.56
Service Workers	Men	5	4.1	83.20	6	4.5	88.83	5	4.1	79.60
	Women	3	4.3	90.00	3	4.3	93.00	3	4.3	87.00
	Men & Women	8	4.2	85.75	9	4.5	90.22	8	4.2	82.37
	Housewives	28	40.0	87.71	28	40.0	89.61	28	40.0	86.86
Unknown	Men	4	3.3	89.25	5	2.5	86.60	4	3.3	97.25
	Women	4	5.7	74.25	4	5.7	79.25	4	5.7	71.50
	Men & Women	8	4.2	81.75	9	4.5	83.55	8	4.2	84.37

It is also to be noted that within each category the number and percentage of subjects having a verbal and performance and full scale IQs may differ. This is due to the fact that ten males were unable to complete a sufficient number of performance tests to enable us to arrive at a valid performance IQ and full scale IQ for these subjects.

G. EDUCATION

An examination of Table 3 discloses that men in our sample achieved a higher level of education than women. This difference is significant at .01 level of confidence. Furthermore, that for both men and women there is a decided relationship between educational status and intelligence. This is similar to previous findings (Wechsler, 1958). In all cases, even where the

TABLE 3
RELATION BETWEEN INTELLIGENCE AND EDUCATION

Education	Sex	WAIS Full N	WAIS Full %	WAIS Full IQ	WAIS Verbal N	WAIS Verbal %	WAIS Verbal IQ	WAIS Performance N	WAIS Performance %	WAIS Performance IQ
Below 8th grade	Men	75	61.5	92.40	79	59.8	95.20	75	61.5	89.01
	Women	54	77.1	88.61	54	77.1	90.39	54	77.1	86.76
	Men & Women	129	67.2	90.60	133	65.8	93.25	129	67.2	88.07
8-11th grade	Men	25	2.0	98.04	28	2.1	100.68	25	2.0	94.16
	Women	5	7.1	91.60	5	7.1	95.00	5	7.1	89.00
	Men & Women	30	15.6	96.97	33	16.3	99.82	30	15.6	93.30
12th grade-3rd yr. college	Men	14	11.5	112.21	16	12.1	114.50	14	11.5	107.00
	Women	9	12.9	103.56	9	12.9	110.44	9	12.9	93.67
	Men & Women	23	12.0	108.83	25	12.4	113.04	23	12.0	101.78
College Graduate	Men	6	4.9	121.00	6	4.5	129.67	6	4.9	107.17
	Women	1	1.4	119.00	1	1.4	122.00	1	1.4	113.00
	Men & Women	7	3.6	120.71	7	3.5	128.57	7	3.6	108.00
Unknown	Men	2	1.6	95.50	3	2.3	96.66	2	1.6	94.00
	Women	1	1.4	66.00	1	1.4	70.00	1	1.4	66.00
	Men & Women	3	1.6	85.67	4	2.0	90.00	3	1.6	84.67

subjects had comparatively little education, the performance IQs are lower than the verbal IQs. This finding conflicts with the WAIS standardization data (Doppelt & Wallace, 1955).

H. AGE

A question arises at this point as to whether, at any given age, there is a reversal in the relationship between verbal and performance tests.

An examination of Table 4, indicates that at every age level (with the exception of age 60-64 for women, where the verbal is lower than the performance), the verbal IQ is higher than the performance IQ.

I. SEX DIFFERENCES

In our culture the social stereotype of a female varies from that of a male. Because of the specific role of the woman in our society with attendant restrictions in movement, social mobility and vocational and avocational opportunities there are differences in personality traits, interests, and possibly intelligence.

In the Jewish subculture, however, some of these pressures are increased and some are decreased. Important subcultural differences may thus follow: How did the different role of the women in this subculture reflect itself on the intelligence rating?

TABLE 4
Intelligence of Foreign Born Jews According to Age

Age	N	WAIS Full	N	WAIS Verbal	N	WAIS Performance
			Men			
60-64	28	94.54	28	98.04	28	89.89
65-69	33	94.48	33	98.15	33	90.45
70-74	29	99.76	32	102.49	29	94.28
75-79	26	102.77	30	103.43	26	99.46
80 & over	6	89.83	9	96.00	6	89.50
			Women			
60-64	20	92.95	20	89.20	20	91.95
65-69	23	83.83	23	88.74	23	79.96
70-74	15	91.40	15	92.20	15	91.53
75-79	9	93.44	9	94.78	9	92.56
80 & over	3	105.67	3	107.67	3	102.33
			Men and Women			
60-64	48	93.86	48	97.60	48	89.29
65-69	56	90.11	56	94.29	56	86.14
70-74	44	96.91	47	99.43	44	93.34
75-79	35	100.37	39	101.44	35	97.69
80 & over	9	95.11	12	98.92	9	93.78

TABLE 5
Significance of the Differences Between the Means of the WAIS of the Foreign Born Men and Women

WAIS	N	Men Mean	SD	N	Women Mean	SD	Diff.	SEd	t
Full	122	97.28	15.48	70	90.23	15.35	7.05	2.33	3.03**
Verbal	132	100.30	16.01	70	93.43	15.52	6.87	2.34	2.94**
Performance	122	93.10	15.62	70	87.44	9.88	5.66	1.85	3.06**

** Significant at .01 level or beyond

Here we can again note that the verbal IQ is higher than the performance IQ in both sexes. Furthermore, men are definitely superior to the women in both verbal and performance areas. The difference is statistically significant for the foreign born group for both full, verbal and performance IQs at .01 level of confidence. It is to be noted that since the level of education is not the same for both groups, it may have depressed the womens' intelligence ratings.

J. Equating of Groups

Since we felt that our sample may not have been equally representative of the two groups, we decided to proceed on the assumption that there are no differences in intelligence between the two groups, and that differences, if any, may be found in the psychometric patterns of the groups. To do otherwise, would automatically give us pattern differences which would be most difficult to analyze. We, therefore, matched 50 pairs of men and women for full WAIS IQs. These subjects had somewhat similar socio-economic backgrounds. The full WAIS IQ for the groups was 93.88 with an SD of 14.07. The mean age for the men was 68.62 with an SD of 5.62; and for the women 68.76 with an SD of 5.73.

TABLE 6
SIGNIFICANCE OF THE DIFFERENCES BETWEEN THE MEANS OF THE WAIS SUBTESTS OF THE EQUATED SAMPLE OF AGED MEN AND WOMEN

Tests	Male		Female					
	No.	Mean	No.	Mean	Diff.	SD	SEd	t
Verbal	50	98.50	50	96.20	2.30	6.62	.95	2.42*
Performance	50	88.84	50	91.26	–2.42	8.59	1.23	–1.97
Verbal								
Information	50	10.12	50	9.30	.82	2.55	.36	2.28*
Comprehension	50	11.26	50	10.92	.34	3.52	.50	.68
Arithmetic	50	10.58	50	9.66	.92	2.78	.40	2.30*
Similarities	50	6.88	50	8.70	–1.82	2.86	.41	–4.44**
Digit span	50	9.90	50	9.24	.66	3.48	.50	1.32
Vocabulary	49[a]	8.53	49[a]	8.67	–.14	2.82	.41	–.34
Performance								
Digit symbol	48[a]	8.98	48[a]	9.13	–.15	2.93	.43	–.35
Picture completion	50	8.20	50	8.28	–.08	2.99	.43	–.18
Block design	50	7.44	50	8.52	–1.08	2.78	.40	–2.70**
Picture arrangement	48[a]	6.58	48[a]	7.85	–1.27	3.40	.50	–2.54*
Object assembly	49[a]	6.94	49[a]	8.04	–1.08	2.81	.41	–2.63**

* .05 level of confidence
** .01 level of confidence or beyond
– In favor of aged women
[a] Some subjects unable to complete either verbal or performance subtests.

In Table 6, the subtest scores are expressed in *age-scaled scores*. An examination of Table 6, indicates that for both men and women the verbal IQ is higher than the performance IQ. Furthermore, men have significantly higher scores on verbal IQ and the following subtests: Information and Arithmetic. Women have significantly higher subtest scores on Similarities, Block Design, Picture Arrangement and Object Assembly.

Doppelt and Wallace (1955) present the WAIS standardization data for the aged 60 (N = 475) or over in four age groups. Their subtest scores are expressed in scaled scores. Their study indicates that of 44 individual differences found, only three were statistically significant. These were in favor of the men and were for two age groups in Arithmetic and for one group in Picture Completion. Wechsler (1958), on the basis of WAIS standardization (ages 16-64; N = 1700), found that men were statistically significantly superior in scaled score subtests in Information, Comprehension, Arithmetic, Picture Completion, and Block Design, and women in Vocabulary, Similarities, and Digit Symbol. Our findings agree with Doppelt, Wallace and Wechsler regarding Arithmetic, and with Wechsler regarding Information and Similarities. They disagree with Wallace, Doppelt and Wechsler regarding Picture Completion, and with Wechsler regarding Comprehension, Block Design, Vocabulary and Digit symbol.

It seems to us that this disagreement in findings may be resolved if we are not concerned with intrinsic sex differences but merely with the way in which the sex of a person determines the role he plays in a certain culture and the resultant cultural forces which change personality and psychometric patterns. Thus, in our case, in the areas which are not dependent upon business experience or learning, the women do as well, if not better, than men. In areas, on the other hand, which depend upon knowledge which can only be obtained either through school or experience in the market place, counting office, or shop, the men are superior to the women. Life's experiences modify the basic intellectual traits posited by one's subculture and hence, apparently, the life's experiences of the aged of the WAIS sample were different than those of the aged studied here. Thus, women are better than men at tests which are least dependent upon the experience in the market place such as: Similarities and Block Design, or tests which depend upon life's experiences of the women such as: Picture Arrangement (social skills), Object Assembly (ability to do sewing, cooking, arranging household objects). Men are better on the other tests which are dependent upon specific experiences on the job or in association with working men; Information and Arithmetic.

We think that differences between verbal and performance abilities for the group, lack of differences in the subtests (for which we find differences in the normative group); and finding the differences in subtests for which we find no difference for the general normative group are largely due to subcultural influences.

K. Discussion

In discussing our findings, we wish to point out that these have to be considered, from at least four points of view: (*a*) our assumption regarding stability of intellectual abilities and the adequacy of WAIS in measuring these; (*b*) findings and artifacts which may be true for the entire culture; (*c*) findings and artifacts which may be due to differences in subculture; and (*d*) artifacts which may be due to differences in age.

Our postulates that the psychological variables have not been changed with age may be seriously questioned. Furthermore, the possibility must be very seriously entertained that the WAIS was inadequately standardized for the ages under consideration, and that possibly our findings, which we ascribe to sex and subcultural differences, may be merely artifacts due to faulty sampling and standardization. Furthermore, another point often overlooked, is the importance of the areas measured to the total economy of the organism. Possibly what we consider intelligence at these ages appears as specialized aptitude and means very little insofar as ability to get along in the circumscribed world of the aged is concerned.

Furthermore, little is known about general cultural conditions influencing test patterns. What about the organization of abilities at these ages? In what way does the organization of abilities vary at different ages and at different subcultures and for men and women? It will be difficult to arrive at an answer to these questions. The research is fraught with difficulty since the very same tasks comprising the tests which may, for some subjects, involve merely routine memories; while for others it may involve a complex reconstruction of difficult concepts. For still others, the interference of unconscious emotional conflicts may bring in an unknown which may confuse or confute all calculations. If we knew what these abilities were to start with, we could then correlate the increase or decrease of test scores measuring these abilities with experience and age. Possibly, if this data were available, we could calculate the contribution made to these abilities by membership in the day centers.

We may need different tests in evaluating the intelligence of aged men and women. Possibly the WAIS is equally inappropriate for both sexes but for different reasons. With foreign born men and women who were products of the "shtetl" and of American "ghettoes," less was expected of the women than of the men. They had different experiences. They had less education. Some of them even though they worked in shops or factories prior to marriage, lost these contacts after marriage. They did not have the same stimulation from the outside world as these men did. Further research would have to establish exactly what the skills were that these men and women used in their occupational and avocational activities. We could then possibly learn what the relationships of these skills to their occupations were, how these skills grew and declined, and how these brought about different WAIS subcultural patterns for the sexes.

We must further consider the differences in motivation. There are, as is well known, unconscious attitudes of interest or disinterest in a certain area of knowledge based upon internalized life's experiences. The questions which then arise are; Were the women as motivated as the men? Were the tests as challenging to the women as to the men? We sometimes neglect to mention that motivation also depends upon the meaningfulness of a certain task. Were the tasks as meaningful to the women as they were to the men?

Even though we found that the WAIS performance of aged Jews corresponds to that of young Jews, one must, in comparing performance of aged and youth, always consider some of these factors which undoubtedly affect psychometric data: (*a*) differences in socio-economic backgrounds of aged and youth used in the sampling of abilities; (*b*) different personal experiences within the same subcultural matrix; (*c*) the meaning of the tests and their importance which vary in the economy of the organism and in its social setting for both young and old; and (*d*) time orientation is different for the young man who looks hopefully to a future life of service and happiness, whereas the older person only looks upon past accomplishment.

L. Summary

A study of aged Jews indicated that their average full scale WAIS IQ was 96.04. The men had higher IQs than the women. The native born men had higher IQs than the foreign born women. The hierarchy of IQs followed the occupational level. At almost all occupational and educational levels, as well as age levels studied, the verbal IQ was higher than the performance IQ. When fifty pairs of IQs of aged men and women were matched, it was found that women had a different constellation of WAIS subtests than men. These did not follow normative standards.

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The Journal of Genetic Psychology, 1962, **100**, 69-76.

THE EFFECT OF AGE ON SPEED OF SIMPLE MANUAL SKILL*

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A. PROBLEM

Surveys (2, 3, 4) of aging effects on motor skills concur in attributing these to central rather than to peripheral processes, to delays in the initiation rather than in the execution of acts. Even simple responses involve the processing and storage of information, and subsequent judgment and decision, and it appears that these account, at least in part, for an increase in inhibitory tendencies with age. It follows that continuous or serial operations performed at *S*'s chosen rate should withstand the adverse effects of age better than tasks requiring discrete reactions; that, having initiated the appropriate responses, older persons can sustain them relatively more efficiently than they would execute a string of disconnected operations.

A further corollary of this general conclusion is that, certain if not all, increments in task difficulty or complexity should slow down older persons proportionately less than younger ones. Birren (1), in fact, summarized the experimental evidence as justifying the "hypothesis that for any constant increment in task difficulty the aged will show a relatively slower but absolutely larger increase in response time." His conclusion was based principally on experiments in which task difficulty was measured by distance between stimulus and response object, by the number of digits to be added, and by the width of the category from which words were drawn in a test of verbal fluency. The generalization, therefore, is not limited to tasks requiring discrete reactions to recurring cues or stimuli. Nevertheless, there are other parameters of difficulty to which Birren's conclusion may not apply. Those increasing the load of information to be processed and stored are examples in point, as are others which combine spatial transposition with translation from one sense modality to another (3). Difficulty created by the requirement of perceptual selection or an instruction to perform two tasks concurrently may also present exceptions to Birren's rule.

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* Received in the Editorial Office on January 27, 1961, and given prior publication in accordance with our policy regarding manuscripts on the subject of aging.

The study here reported was concerned with three aspects of aging effects on motor performance. First, Welford (4) concluded that the effect of aging is relatively slight on speed in simple tasks, but becomes greater "when movements have to be carried out in a continuous co-ordinated series." It is quite evident that the requirement of co-ordination does impose greater difficulties on older persons, but not so certain whether continuity itself does. In fact, the reasoning followed above would lead to the conclusion that continuous non-complex, e.g., repetitive, performance declines least with age. The first purpose of the experiment, therefore, was to determine the effects of aging on a simple, repetitive motor skill which involves no perceptual discrimination.

Second, the study investigated certain parameters of perception, for their differential effect on speed of motor performance at different ages. More especially, it treated the perceptual component of the task as a parameter which provides for greater or lesser degrees of difficulty, and examined Birren's rule in respect of this type of difficulty. Third, difficulty arising from the simultaneous performance of the simple motor task and the perceptual motor task—in both its easier and more difficult version—was studied for its differential effect at various ages.

B. METHOD

1. *Subjects*

Men in three age ranges were sampled. Veterans of the Spanish-American War[1] supplied two groups of *S*s representing the oldest: 18 men between 76 and 89 years, with a mean of 80.7 and *SD* 2.9, and 17 men between 75 and 88, with a mean of 82.7 and *SD* 1.98. A middle-aged group consisted of 18 men between 40 and 63, with a mean of 52.8 and *SD* 8.9. Two groups of college students, 18 *S*s in each, in their early twenties represented the youngest age range. All *S*s were in good health; none was color blind or suffered from a visual or motor defect which might have interfered with his test performance.

2. *Procedure*

The following three tasks were set to *S*s, singly or two combined: (*a*) working a manual counter held in the non-dominant hand, and operated with the thumb of that hand: (*b*) picking up beads with tweezers from a homogeneous stock of red beads placed in one bowl, and transferring them singly into another bowl; and (*c*) performing the same task with blue beads which were mixed with an equal number of yellow beads. The tweezers were held in *S*'s dominant hand; they were pointed and of a shape which did not allow for lifting more than one bead at a time. The beads were made of wood, 3/16 of an inch in diameter; the bowls were round, 1¾ inches deep, 3¾ inches wide at the top, 3 inches at the bottom, and rested in sockets so that their midpoints should be constantly 6 inches apart. They were placed on a table within comfortable reach of *S*, and one about 1/3 full at the side of his dominant hand, the empty one close to his midline.

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[1] The author wishes to thank Dr. Oliver J. Harris, Assistant Director and Dr. James F. Cummins, Chief of Geriatric Service, of the V.A. Outpatient Clinic, Boston, for their co-operation in providing the *S*s of the Veteran group.

The experiment was preceded by a brief practice with the counter and 60-seconds practice with the red beads. It consisted of ten tests, each lasting 60 seconds, of which the first five were: (*a*) red beads only; (*b*) counter only; (*c*) counter and red beads; (*d*) blue beads; and (*e*) counter and blue beads. The last five consisted of the same tasks in this order: d, e, b, c, a. An extended version of the experiment followed the same program, but then included five more tests: e, d, e, c, e. Breaks between tests were just long enough for *E* to write down the score, to empty and refill the bowls, and to give *S* the next instruction. The number of beads transferred was counted during the performance, and the counter indicated the score automatically.

*S*s were instructed to press down the counter as often, and to transport as many beads, i.e., to work as rapidly as they were able to. They were also told that each test would last for a minute. They were warned not to try and lift more than one bead at a time, but were given no directive about errors, either by picking the wrong colored bead or by dropping a bead beside the target bowl. Errors were recorded, but occurred too infrequently to warrant analysis. Any error would in any case be registered by its effect in reducing the performance score.

C. RESULTS

Mean performance scores on the several tasks are set out in Table 1. The scores of the Veteran and student groups are based on samples of 35 and 36 men respectively. Since the two groups representing the youngest and oldest age range did not differ significantly one from the other on any of the tasks, it seemed preferable to present data obtained from the larger samples. The scores represent mean performance for a 60-second period, i.e., the average of two trials under identical instruction, or of the first two trials when the same task was set three or more times within one experimental session.

TABLE 1
MEAN RATE OF PERFORMANCE PER 60 SECONDS

	Veterans	Middle-aged	Students
Counter alone (C)	142.9	187.3	197.9
Counter with red beads (C_r)	86.5	113.3	165.4
Counter with blue beads (C_b)	73.6	109.3	164.1
Red beads alone (R)	25.6	31.9	41.6
Red beads with counter (R_c)	22.9	28.7	39.0
Blue beads alone (B)	21.9	27.6	38.8
Blue beads with counter (B_c)	19.9	26.0	36.6

As tested by t ratio, the students worked significantly faster on every task than the intermediate group; ($p < .001$ for all seven tests). By the criterion of the same statistical analysis or, when the heterogeneity of the variances demanded a non-parametric technique, by that of the Mann-Whitney test, the intermediate age group worked significantly faster ($p < .001$) than the Veterans in pressing the counter alone and while picking blue beads, in picking blue beads alone and while pressing counter with the other hand. In moving red beads, both alone and combined with counter pressing, and in pressing the counter while picking red beads, the difference was significant at the .05 level.

Differential and ratio scores showing absolute and relative decrement in performance while engaged in a concurrent second task are given in Table 2. Total decrement for two simultaneous tasks could, of course, be determined only in relative terms, since scores on counter and beads

TABLE 2
ABSOLUTE AND RELATIVE DECREMENT IN PERFORMANCE WHEN TWO TASKS WERE PERFORMED SIMULTANEOUSLY

	Veterans	Middle-aged	Students
Absolute decrement per 60 seconds			
Counter with red beads ($C-C_r$)	56.2	74.0	32.6
Counter with blue beads ($C-C_b$)	69.4	78.0	33.9
Red beads with counter ($R-R_c$)	2.7	3.2	2.2
Blue beads with counter ($B-B_c$)	2.0	2.3	2.2
Blue beads selected (R-B)	3.6	3.8	2.8
Relative decrement			
Counter with red beads (C_r/C)	61.0	61.7	84.9
Counter with blue beads (C_b/C)	53.5	59.5	84.2
Red beads with counter (R_c/R)	90.4	94.2	94.6
Blue beads with counter (B_c/B)	90.2	94.7	96.0
Blue beads selected (B/R)	90.5	90.8	93.8
Counter and red beads ($C_r \& R_c/C + R$)	75.6	78.0	88.5
Counter and blue beads ($C_b \& B_c/C + B$)	71.9	78.8	89.5

were in widely different ranges, and their ratio was highly inconstant. Differential and ratio scores were calculated for individual subjects, and inter-group differences were determined with reference to the distribution of these data.

The decrement in bead picking attributable to the requirement of perceptual selection (R-B; B/R) was statistically significant in each of the three groups, but inter-group differences in either differential or ratio scores were negligible and far short of the five per cent level of significance.

Decrement in counter pressing, while moving beads with the other hand, was significant for all three groups, both in absolute ($C - C_r$; $C - C_b$) and in relative (C_r/C; C_b/C) terms. Either way, the decrement was significantly less ($p < .01$) for the students than for the other two age groups. Though the general trend indicated continued decrement with increasing age, its magnitude was not significantly different between the Veterans and the middle-aged men.

Decrement in bead picking, while working the counter with the other hand, was significant in relative (R_e/R; B_e/B) but not in absolute ($R—R_e$; $B—B_e$) terms for all three groups. Inter-group differences were slight and not statistically significant. Decrement in total, i.e., bimanual performance (C_r & $R_e/C + R$; C_b & $B_e/C + B$) as compared with performance when the two hands were engaged singly in the same tasks, was significant in all three groups. Differences between the students and the middle-aged men were significant at the .05 level ($t = 2.24$ and 2.14); between students and Veterans at the .001 level ($t = 3.70$ and 4.60); between middle-aged men and Veterans not significant ($t = .39$ and 1.70).

Since a number of Veterans in the first sample of 18 improved their bead picking rate from first to second trial, there seemed to be reason for taking practice effects into consideration. Differences between first and second trial, however, were not statistically significant. The purpose of the extended experiment of 15 trials was further to investigate the practice effect. The second groups of 17 Veterans and 18 students, as well as eight of the middle-aged men, were tested on the longer schedule. No significant or consistent trends emerged in any of these groups either across the three trials with red beads, or the three trials which combined counter pressing with moving red beads, or the five trials which combined counter pressing with the selection and moving of blue beads.

D. Discussion

The motor tasks set in this experiment consisted of very simple operations and, although they did not copy exactly any much rehearsed activity of either old or young *S*s, neither did they require the acquisition of a novel skill. They were performed at *S*'s own chosen rate; they demanded neither the processing nor the storage of information; they involved no problem solving, nor the reversal of old established habits. In all these respects they would be expected to resist the restrictive effects of aging on speed of performance. The counter task, moreover, called for a rhythmic activity, each movement providing the cue for the next, and depending on none but these kinesthetic cues. It excluded the necessity of choice or the possibility of error. For these reasons it should have proved an insensitive test of aging effects. In fact, however, speed in counter pressing appears to decline at a statistically significant rate from the twenties to middle age, and then progressively to the late seventies and eighties. It appears that continuous performance, even without the need to co-ordinate several effector operations, deteriorates in speed with the progress of years.

There is no convincing reason for attributing these results to influences other than the biological changes characteristic of aging.[2] Neither evidence intrinsic to the study described, nor any based on our other experiments would support the alternative hypotheses that lack of motivation or fatigue, in the sense of very rapid progressive decrement in performance, may account for the findings. Nor can they be attributed to the circumstance that this skill was tested on *S*'s non-dominant hand, since the same aging effects have emerged from an experiment which required counter pressing with the preferred hand. Admittedly, the evidence of deterioration typical of the entire groups of middle-aged men and of Veterans does not apply to all their members alike. In fact the three highest scores were evenly distributed among the three age groups. The bulk of the middle-aged men, however, clustered somewhat below their group mean; over half of the Veterans scored below theirs. Even in that low range, there was considerable variability in the Veterans' speed, and consequently the variance of the entire group far exceeded that of the two other groups.

Proportionately the deterioration in efficiency concomitant with age was larger on the bead picking than on the counter pressing test. This is as would be anticipated, since manipulating the tweezers involves finer and more complex motor skills, and furthermore the task requires renewed initiative and a certain measure of judgment for each of the serial operations. The two tests are not comparable along any single dimension of difficulty. Moving red beads and selecting blue beads before moving them, however, are so comparable. By the evidence of the present experiment this perceptual parameter of difficulty is not one that accounts for loss of speed with increasing age.

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[2] These changes naturally are not only neural, and include, e.g., the mechanical effects of osteoarthritis.

The other parameter of difficulty examined—that of dividing attention between two simultaneous activities—weighs more heavily on older than on younger persons, and does so at a relatively early phase of aging. Its effect on middle-aged men and on old men is not markedly different, though the trend is continuous with the accumulation of years. The foregoing generalization is justified by the results reported if we consider the two concurrent performances jointly, or one of the two singly, but not the other.

Why did the older *S*s make an effort to maintain their proficiency in moving beads at the expense of counter pressing, when these two operations were performed simultaneously? It seems as if, by choice or some necessity, they had concentrated on the more difficult of the two tasks, and had thus tied up proportionately more of their resources available for the easier task than younger men. It is debatable whether the experiment reported would justify any wide generalization. Counter pressing is a rhythmic activity, and the rhythm can easily be interrupted. Moving beads with one hand almost invariably interrupts the rhythm of the other hand. The most favored, and probably also the most efficient, solution is to superimpose the rhythm of one activity on the other: to press the counter three, four, five times between any two beads. Even so, there is likely to be a short break in counter pressing while the tweezers are moved back after the delivery of a bead, and the rhythm is resumed with the next approach to the full receptacle. Now, this preparatory phase tends to be longer with older subjects, and consequently their counter pressing too is subject to longer breaks. The length of these interruptions more than offsets their lower incidence.

When two motor tasks are to be performed simultaneously, it is quite common that they each proceed at a different rate. It is therefore reasonable to conclude from the experiment reported that increased difficulty, arising from the requirement to perform different operations concurrently with the two hands, will cause a larger total decrement as measured by speed or rate in older than in younger subjects. This effect may be manifested only in one of the two concurrent activities. It involves a relative as well as absolute decrement, and can be detected in middle age; its progressive increase from the forties to the eighties appears to occur at a slow rate.

E. Summary

The effects of aging were tested on speed in two simple motor tasks. Three age groups were sampled: men in their early twenties, between 40

and 63, and between 77 and 89. The tasks were: (*a*) continuous working of a manual counter; (*b*) moving beads with tweezers from one receptacle to another; and (*c*) selecting beads of one hue from a mixed stock, and moving them with tweezers. These tasks were performed singly, and the latter two also in combination with the first which was always done by *S*'s non-dominant hand. Each single or combined operation was performed continuously for two or more periods of 60 seconds.

Rate of performance dropped significantly on each task—separately and in combination—from the youngest to the intermediate, and again from the latter to the oldest age group. The results suggest that even the simplest motor skill declines in speed with age, even though it involves little exertion or the co-ordination of component operations.

The rule that increase in difficulty results in a larger absolute but smaller relative delay in response time has no general validity. Increasing the difficulty of the visual motor task of moving beads, by imposing on it the restriction of a selective criterion, slowed down the performance of all three age groups, and to much the same extent in absolute or relative terms. Increased difficulty arising from the concurrent performance of two tasks also reduced rate of performance, but did so to a greater extent with the middle-aged and old men than with the youngest. This differential age effect, however, appeared almost entirely in one of the two tasks, counter pressing; it was barely manifest in the rate at which beads were moved. Such aging effects on speed of performance as were observed occurred alike in absolute and relative terms.

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The Journal of Genetic Psychology, 1962, **100**, 77-84.

AGING AND EXPRESSIVE MOVEMENTS: AN INTERPRETATION OF AGING IN TERMS OF EYSENCK'S CONSTRUCT OF PSYCHOTICISM*

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A. Introduction

The present paper presents an interpretation of certain aspects of aging in terms of the theory of personality advanced by Eysenck (e.g., 1952, 1960) and in particular his construct of psychoticism. The general framework within which the argument is presented is as follows: the study of aging involves the elucidation and explanation of individual differences between young and old and can be considered as a special case of the general problem of individual differences which is the province of personality theories. One of the most advanced of these is that of Eysenck, whose theory has been built up from factor analytic studies and which at present posits four independent dimensions of personality, namely neuroticism, introversion-extraversion, psychoticism, and intelligence. Our argument is that the aging process can be envisaged as entailing shifts along one or more of these personality dimensions and that a large number of the known facts of aging fall into place when considered in this way. The hypothesis we are concerned with here is as follows: there is with aging a shift along the psychoticism dimension such that psychoticism increases with age.

B. Psychoticism and Aging

The hypothesis that aging entails a shift towards psychoticism generates two important predictions, both of which must be verified if the hypothesis is to be regarded as confirmed. The first is this. Psychoticism is regarded as a characteristic continuously distributed in the population, i.e., there are different degrees of psychoticism among normal people and psychotics fall as an extreme group at one end. If this is so, and if there is a shift towards psychoticism with aging, then as people get older, more and more will fall into the extreme range in which people break down with psychosis and

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* Received in the Editorial Office on February 13, 1961, and given prior publication in accordance with our previous policy regarding manuscripts on the subject of aging.

receive hospital treatment. We shall therefore expect that the proportion of each age group diagnosed as psychotic will rise steadily from adolescence to old age, and reference to statistical records shows that this is in fact the case, both in the U.S.A. and in England (Hollingshead, 1959; Registrar General's Statistical Review of England and Wales, 1953). The first implication of the hypothesis is therefore confirmed.

The second major implication of the hypothesis is that tests of psychoticism should differentiate old people from young. The principal tests of psychoticism, together with evidence concerning this prediction, are enumerated below.

1. *Slowness*

This is one of the best established tests of psychoticism (Eysenck, 1952; Payne and Hewlett, 1960). Psychotics have been found to be slow in a wide variety of tasks of which the most important are these: (*a*) simple reaction times: psychotics have been reported as slow in simple visual reaction times (Venables and Tizard, 1956) and simple motor responses such as drawing three squares (Eysenck, 1952; Payne and Hewlett, 1960) and tapping with a pencil; (*b*) choice reaction times: slowness in psychotics has been reported in choice reaction times to lights (Venables, 1958), in card sorting, reading prose and mirror drawing (Eysenck, 1952); (*c*) problem solving: slowness in psychotics has been found on simple intelligence tests and in explaining the meaning of proverbs (Payne and Hewlett, 1960) and in solving arithmetic problems (Eysenck, 1952). In their recent study, Payne and Hewlett (1960) have intercorrelated and factor analysed a number of speed tests and found a general factor of retardation, which they identify with psychoticism.

It is well established that this general factor of retardation is also present in old people: (*a*) In simple reaction times, slowness in old people has been reported in finger lifting responses (Miles, 1931) and in writing figures (Welford, 1958); (*b*) In choice reaction times, old people have been found slow in tasks of making different responses to different lights (Szafran, 1951; Leonard, 1952; Singleton, 1954) and in card sorting (Crossman and Szafran, 1956; Suci, Davidoff, and Surwillo, 1960); (*c*) Problem solving: old people have been reported as slow by Kay (1951) and Clay (1954, 1957).

2. *Fluency*

Psychotics were found to be less fluent in naming birds, flowers and animals by Eysenck (1952). Similarly, old people have been reported as showing low word fluency by Birren (1955) and Speakman (quoted by Welford, 1958, p. 181).

3. *Reversible Perspective*

A slower rate of reversals on the Necker Cube in psychotics was reported by Eysenck (1952) and a slower rate among old people using the Schroder staircase was found by Speakman (quoted by Welford, 1958, pp. 170-171). It is unfortunate that the same reversible perspective figure was not used by both experimenters, but since Thurstone (1944) has shown that tests of reversible perspective intercorrelate it is reasonable to assume that they reflect the same process.

4. *Vigilance*

Psychotics have been found to be poor in vigilance tasks, i.e., tasks in which sustained attention is required for a long period of time. The finding was reported by Claridge (1960) using a task of listening to a continuous stream of random numbers for forty minutes and recording the occurrence of three successive odd numbers. Using exactly the same task, poor performance in old people has been found by Griew (1961).

5. *Time Judgments*

A tendency for psychotics to underestimate periods of time has been reported by Claridge (1960) and a similar tendency for old people by Feifel (1957).

6. *Perceptual Processes: Vision*

Low efficiency of perceptual functioning among psychotics has been reported by Eysenck, Granger and Brengelmann (1957); the functions discriminating psychotics from normals include dark vision, visual acuity, accommodation, binocular fusion, colour vision, retinal rivalry, peripheral span, perception of quantity and speed of recognition. It is well known that the efficiency of perceptual processes decreases with aging; since the subject has been thoroughly reviewed recently by Weiss (1959) the evidence will not be marshalled at length here.

7. *Perceptual Processes: Pain Perception*

There is some evidence that psychotics have high thresholds for pain perception (Hall, 1953; Hall and Stride, 1954). Similarly, where age changes in the perception of pain have been reported they have been in the direction of higher thresholds among old people (Chapman and Jones, 1944; Critchley, 1956).

C. Aging and Expressive Movements

The hypothesis that aging entails a shift towards psychoticism generates predictions and a test of one of these is presented in this section. According to the recent review of Brengelmann (1960), one of the best established tests of psychoticism is expressive movements, the findings being that psychotics make larger expressive movements than normal subjects. The possibility that expressive movements may be related to aging does not appear ever to have been considered (expressive movements are not indexed in Birren's (1959) Handbook of Aging), but it can be predicted from the present theory that old people will make larger expressive movements than young. This prediction was tested in the following way.

1. *Subjects*

The sample of old people were 40 convalescents from the geriatric ward of a general hospital. All *S*s were tested within a day or two of their discharge from the hospital and had fully recovered from their illnesses. Cases with psychiatric involvement were excluded. The mean age of the sample was 70.2 years, *SD* 8.6. There were 15 women and 25 men. Two samples of young people were taken. First, the scores of the old people were compared with Eysenck's (1952) published norms based on 100 conscripted soldiers aged 21 years. A second young sample comprised 45 female students (mean age = 18.5) at an occupational therapy college (the whole of the first year intake). These students are somewhat above average in intelligence, but since psychoticism is largely independent of intelligence this should not unduly impair the value of the sample as a young control group. The point can be checked by comparing the occupational therapy students' scores with those of Eysenck's controls.

2. *Procedure*

The procedure followed exactly that used by Eysenck (1952) in his battery of tests differentiating psychotics from normals. Two tests of expressive movement were given, namely drawing three squares and writing the numbers 1 to 20. *S*s were given a sheet of paper 22 × 28 cm. and asked to draw the three squares and write the numbers in their own time. The measurements taken were the average diagonal of the three squares and the length of the numbers (all measurements are in millimetres). The mean scores are presented in Table 1.

3. *Results*

The old people made significantly larger drawings of squares than the young female sample ($t = 3.11$, $p < .01$). The number writing of the old

TABLE 1
EXPRESSIVE MOVEMENTS OF OLD AND YOUNG SAMPLES ON TASKS OF DRAWING THREE SQUARES AND WRITING NUMBERS 1 TO 20
(Measurements in millimetres)

N	Old People 40	Young Female O.Ts. 45	Eysenck's soldiers 100
1. Three Squares			
Mean	42.3	23.7	24.91
SD	14.10	8.94	6.78
2. Number Writing			
Mean	184.8	172.0	182.43
SD	49.60	44.80	52.93

people is also larger than that of both young samples, but the difference is not statistically significant (for the difference between the old people and the young females, $t = 1.76$). The scores of the present young sample of female O.T. students accord reasonably well with Eysenck's norms. The results give some degree of support to the prediction that old people make larger expressive movements.

D. DISCUSSION

The evidence appears to support reasonably well the hypothesis that old people and psychotics have a number of behavioral characteristics in common and that the aging process may be viewed in terms of Eysenck's personality theory as involving a shift towards psychoticism. The term psychoticism should be understood as a construct in the sense defined by Cronbach and Meehl (1955), and it may be noted that the evidence on aging reviewed here provides additional support for the validity of the construct, since it has been shown that all tests of the construct are affected in the same direction under the impact of the changes that take place with aging. Eysenck's theory therefore not only pulls together a number of findings on aging, but is also itself substantiated by the aging literature.

The validity of psychoticism as a construct is probably sufficiently well established to justify some theoretical speculations concerning its nature, if only because of the impetus such speculations give to research endeavours. There are two interpretations that appear to the writer to be the most promising. The first relates psychoticism to insensitivity to stimuli, or, more formally, to Hull's construct of stimulus intensity dynamism (V), the assumption being that psychoticism is a function of low values of V. Such an assumption has the following attractions. First, it follows readily from the findings of poor perceptual efficiency in psychotics and old people.

Secondly, it explains the low rate of reversible perspective reversals among psychotics and old people, since it has been shown that reversal rate is a function of stimulus intensity (Lynn, 1961). The low reversal rate among psychotics and old people therefore implies that they perceive stimuli less intensely. Thirdly, low sensory input has the effect of lowering arousal (e.g., Berlyne, 1960). Many of the characteristics of psychotics and old people can be explained in terms of low arousal, notably their slowness, poor fluency, and poor vigilance. This interpretation is also strengthened by Mednick's (1958) experiments indicating a low level of drive in chronic schizophrenics, since the concepts of arousal and drive can probably be identified (e.g., Berlyne, 1960). Fourthly, if psychoticism is a function of low sensory input it should be possible to shift subjects towards psychoticism experimentally by reducing the stimulation available to them. This implication is supported by the work on sensory deprivation, in which subjects deprived of stimulation develop psychotic symptoms and are slow in test performance (Bexton, Heron, and Scott, 1954). On the other hand, it is not clear how either low perceptual efficiency or low arousal or drive can account for expressive movements or time judgments being measures of psychoticism and further research must determine how far they can be explained within this theoretical framework.

The second concept that appears promising in the explanation of psychoticism is that of inhibition, the assumption being that psychotics generate inhibition readily (Venables and Tizard, 1956) or, having generated it, dissipate it slowly (Claridge, 1960). An explanation along these lines handles quite well the findings on speed, fluency, vigilance, and time judgments (as its exponents have argued). It is not altogether clear how readily it can explain the association of expressive movement and low perceptual efficiency with psychoticism. But it encounters most difficulty with the findings on reversible perspective; assuming that reversal rate is a function of speed of satiation, and that satiation is an effect of inhibition (as Eysenck (1957) argues), then the assumption of high inhibitory potentials in psychotics and old people would entail the prediction that they would have *fast* reversal rates, whereas in fact the reverse is the case. We are inclined to conclude that at present both the stimulus intensity-arousal and the inhibition interpretations of psychoticism and aging handle a number of the facts, although neither explains all satisfactorily.

E. SUMMARY

It is argued that a number of findings on aging fall into place when considered in relation to Eysenck's construct of psychoticism. The hypothesis

is put forward that there occurs with aging a shift along the psychoticism dimension such that psychoticism increases with age. Two principal predictions follow from the hypothesis. First, there should be a higher incidence of psychosis with increasing age. Secondly, tests of psychoticism should differentiate old people from young. A review of the literature substantiates both predictions.

It was predicted from the hypothesis that expressive movements, a test of psychoticism, would differentiate old people from young. An investigation was made of age differences in two tests of expressive movement. Both tests differentiated young people from old in the predicted direction, but only one of the differences was statistically significant.

The theoretical explanation of psychoticism is discussed. It is concluded that the assumption that psychoticism reflects individual differences in sensitivity to stimuli or in inhibition are both able to explain a number of the facts. Further research is needed to differentiate between them.

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The Journal of Genetic Psychology, 1962, **100**, 85-91.

SENESCENCE AND FIGURAL AFTER-EFFECTS IN TWO MODALITIES*

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A. Introduction

In 1933, Gibson showed that prolonged inspection of a stimulus *I* leads to systematic changes in the subsequent perception of a test stimulus *T*. Köhler (1940, p. 72) proposed that such changes could be accounted for if the assumption is made that "a figure process in the brain seems to have some effect by which it tends more and more to block its own way"; and Köhler and Wallach (1944) have presented a detailed theoretical and empirical analysis of these figural after-effects. Apparently-analogous after-effects have been demonstrated in vision, kinesthesis, and audition (*cf.* reviews by McEwen, 1958, and Spitz, 1958).

To our knowledge, there has been only one experiment reported in which the effects of senescence on figural after-effects have been approached. Rich (1957), working with 50 old-age-home residents between 65 and 89 years of age, found small but systematically negative correlations (ranging from —0.068 to —0.309) between age and various measures of susceptibility to visual and kinesthetic after-effects after varying durations of inspection; correlations between measures of susceptibility in the two modalities averaged out at +0.120. Rich interpreted his results to suggest that advanced age decreases susceptibility to after-effects, and does this independently in the two modalities. The first inference is in line with Wertheimer's (1955) suggestion that susceptibility to after-effects is partly determined by some sort of physiologic "efficiency"; the second calls into question the postulation of a unitary personality or physiologic basis common to after-effects in all modalities (Wertheimer, 1955).

Rich's investigation was limited to *S*s aged 65 and older. On the basis of his findings and interpretation, it would be expected that young adults

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* Received in the Editorial Office on February 15, 1961, and given prior publication in accordance with our policy regarding manuscripts on the subject of aging.

[1] We are grateful to Dr. David Arenberg for advice and assistance. Technical assistance was provided by Mrs. Elaine Crovitz and Mrs. Felice Katkin. This work was supported in part by National Institutes of Health Grants M 900C, M 2109, and H 3582. Professor Karl Zener kindly lent us the apparatus for this experiment.

would show markedly greater susceptibility to after-effects than would senescents.

This paper will report on a study in which young and senescent adults were compared in magnitude of figural after-effect in vision and kinesthesis.

B. METHOD

1. *Subjects*

Thirty-two men aged 60-76 years (mean = 67.5, *SD* = 4.0) and 33 men aged 18-34 years (mean = 23.5, *SD* = 4.1) served as *S*s. These *S*s were recruited from the Durham office of the North Carolina Employment Security Commission, and were paid for their participation.

2. *Apparatus and Procedure*

a. Kinesthetic after-effects. The apparatus used in measuring kinesthetic after-effects consisted of four plexiglass strips, (two inspection strips I_W and I_N, and two test strips T_M and T_G), each 1/2 inch thick. Strip I_W (wide) was 3 inches wide, strip I_N (narrow) was 1/2 inch wide, and strip T_M (medium) was 2 inches wide, these strips were 36 inches long. Strip T_G (graduated) varied by 1/12-inch steps from 3 inches to 7/12 of an inch in width and was 60 inches long. The apparatus was modelled after that described by Köhler and Dinnerstein (1947).

The experimental set-up is schematized in Figure 1. The blindfolded *S* stood between I_W and T_G on his left, and T_M and I_N on his right; he stood facing in the direction in which the narrow end of T_G was "pointing." The experimenter (*E*) placed *S*'s right hand on T_M, and *S*'s left hand on T_G at some point where the width of T_G was clearly wider than that of T_M, instructing *S* to place his thumb on one side of the strip and his fingers on the other. *S* then was asked to find the width on T_G which matched the width of T_M. This procedure was repeated four more times, and was followed by 10 matches in which *S* started from the narrow portion of T_G, and then five matches from the initial starting position.

S's left hand was then placed on I_W and his right hand on I_N. He was instructed to run his hands back and forth along the two strips continuously for 60 seconds. Immediately after this 60-second inspection period, *S*'s hands were again placed on T_G (wide portion) and T_M, and he was asked to match a place on T_G with the width of T_M. At 20, 40, 60, 90, and 120 seconds after the end of the inspection period, this procedure was repeated. The 60-second inspection period was then repeated, and a series of matches at 0, 20, 40, 60, 90, and 120 seconds after inspection was made, all starting from the narrow end of T_G. A third inspection period and series of matches were made, the initial position of *S*'s left hand during matching being at the narrow end of T_G. Finally, a fourth inspection period and series of matches were made, the initial position of *S*'s left hand during matching being at the wide end of T_G.

This procedure was followed with approximately half the *S*s; with the other half, "narrow" and "wide" were reversed. An after-effect in the expected direction would result in an overestimation of T_M.

b. Visual after-effects. Figure 1 includes a schematic representation of the apparatus used. The test figure consisted of a fixation point (FP) 15/32 of an inch in diameter; a stationary black rectangle (T_1), 1 inch wide, placed so that its right edge was 3 inches to the left of the center of FP; and a movable black rectangle (T_2) 1 inch wide, whose horizontal position could be varied by means of a hand wheel. The inspection figure consisted of FP and a black rectangle 1 ½ inches wide placed so that its right edge was 15/16 of an inch to the left of the center of FP. The backgrounds were a uniform gray. Distance from the eye of the seated *S* to the stimulus patterns was approximately 40 inches. *S* was instructed to fixate FP and to set T_2 so that it was as far from FP as T_1 was. The sequence of events was exactly analogous to that employed in measuring kinesthetic after-effects. Approximately half the *S*s made five pre-inspection settings by moving T_2 *toward* FP, then 10 by moving T_2 away from FP, then five in the initial direction. This was followed by 60 seconds of fixation of the inspection figure, and then test settings were made at 0, 20, 40, 60, 90, and 120 seconds after inspection by moving T_2 *toward* FP. A second inspection was followed by six test settings made by moving T_2 *away* from FP. A third inspection period was followed by the test settings made by moving T_2 *away* from FP; the fourth and final inspection was followed by test settings made in the "toward" direction. For the remaining half of each group, "away" and "toward" were reversed. An after-effect in the expected direction would lead to an overestimation of the distance between T_1 and FP.

C. Results

Figure 1 shows the after-effects for both age groups, in both modalities, at the six post-inspection times. For clarity, the curve for the combined groups (young plus elderly) in the visual experiment has been drawn in. The ordinates of the points in the visual curves at 60 and 120 seconds for the elderly, and at 20 and 120 seconds for the young are significantly greater than zero at better than the .05 level; all others are significant at better than the .01 level. Neither the age effect nor interactions involving age were significant in either modality. The interval effect was significant at the .05 level in the visual experiment ($F = 2.48$ with 5 and 280 *df*), and at the .001 level in the kinesthetic experiment ($F = 26.90$ with 5 and 280 *df*).

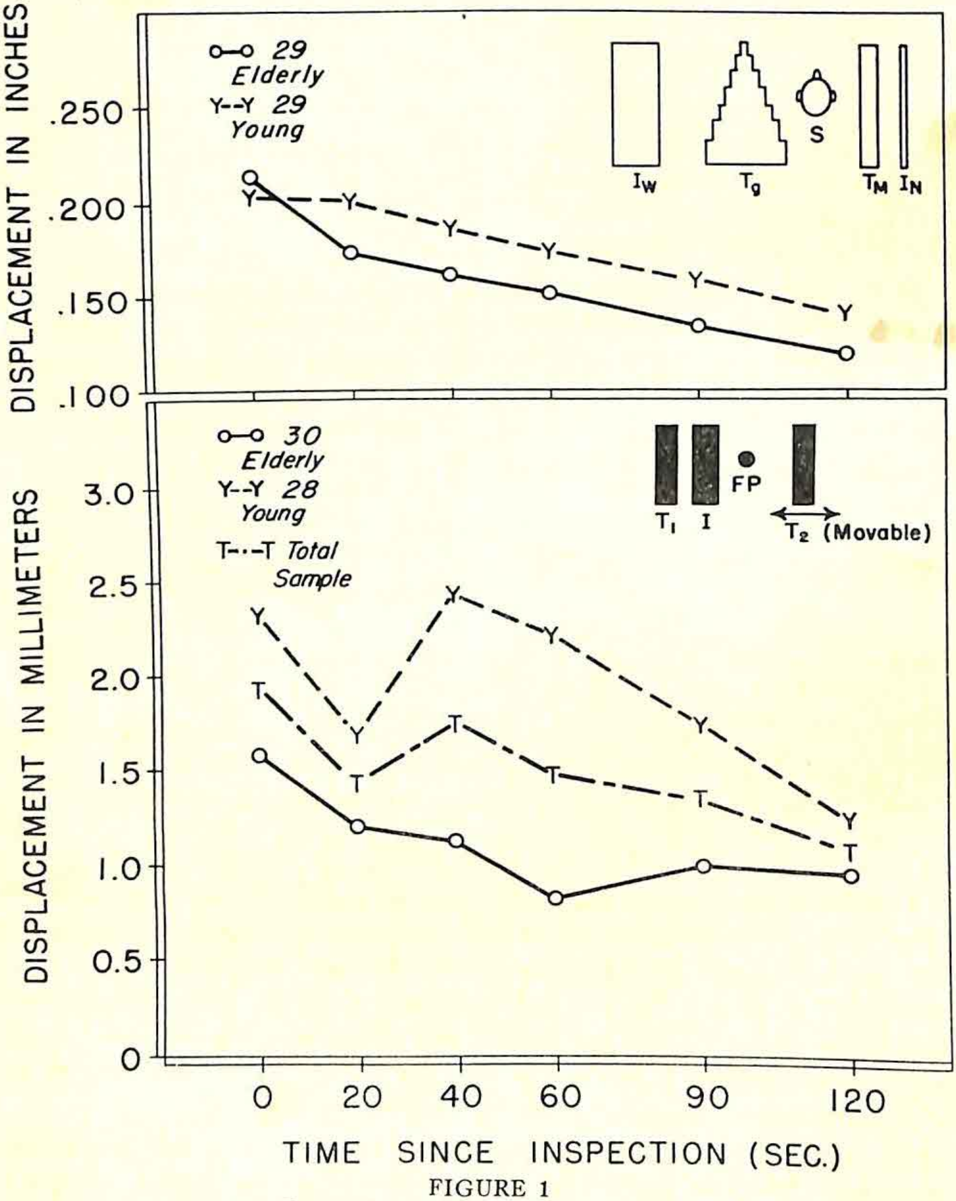

FIGURE 1

After-Effects as Functions of Time Since Inspection. Upper Ordinate, Kinesthetic After-Effects; Lower Ordinate, Visual After-Effects

Table 1 gives the correlations between visual and kinesthetic after-effects for the *S*s who served under both conditions. The correlations are uniformly negative and quite low.

TABLE 1
CORRELATIONS BETWEEN FIGURAL AFTER-EFFECTS IN VISION AND KINESTHESIS

	Time since inspection (Seconds)						
Group	0	20	40	60	90	120	Total
Elderly ($N = 27$)	—.093	—.388*	—.287	—.337	—.186	—.334	—.367
Young ($N = 24$)	—.375	—.420*	—.244	—.213	—.174	—.288	—.398
Total ($N = 51$)	—.207	—.371**	—.223	—.243	—.159	—.313*	—.353*

* $p < .05$.
** $p < .01$ (2 tails).

Table 2 gives the correlation coefficients between age and after-effects within each of the age groups. The young *S*s showed no meaningful trend; the elderly *S*s had consistently positive correlations between age and kinesthetic after-effect, and negative ones between age and visual after-effects. (Since the correlation coefficients at the various post-inspection times are not independent, combined probabilities can, of course, not be computed.)

TABLE 2
CORRELATIONS BETWEEN AGE AND AFTER-EFFECTS

			Time since inspection (Seconds)						
		N	0	20	40	60	90	120	Total
Elderly	Kinesthetic	29	.363	.431*	.379*	.396*	.253	.236	.364
	Visual	30	—.156	—.112	—.265	—.291	—.320	—.372*	—.350
Young	Kinesthetic	29	.167	.034	—.071	.057	—.019	—.143	.002
	Visual	28	.129	.127	—.021	.003	—.171	—.106	—.002

* $p < .05$ (2 tails)
Note: Positive *r*s indicate direct association between age and overestimation.

D. DISCUSSION

Contrary to expectation, senescence does not appear to have a pronounced effect either on susceptibility to, or time course of, figural after-effects as we have measured them; the differences indicating greater mean effects shown by young *S*s (in all but the 0-second kinesthetic situation) did not approach significance. If, as Wertheimer (1955) and others have implied, low susceptibility to after-effects is deficit behavior, then elderly persons seem not to be at a deficit relative to young adults in these performances.

The tendency toward negative correlations between visual and kinesthetic after-effects limits the applicability of the notion of a general factor underlying after-effects in the two modalities; in fact, it suggests that high susceptibility to after-effects in one modality may be associated with a lesser susceptibility in the other. In view of the low order of magnitude of these correlation coefficients, it is probably safer to conclude with Rich simply that after-effects appear to be modality-specific. A similar conclusion may be drawn from the finding, in the senescent *S*s, of low-order direct association of age and kinesthetic after-effects, but low-order inverse association of age and visual after-effects. Wertheimer (1955) has reported direct association between vision and kinesthesis both in after-effects and in changes in after-effects after one week. It seems possible that the heterogeneity of Wertheimer's group (14 normal males, eight normal females, three schizophrenic males) may have given rise to total correlations based more on group differences than on within-group correlation. Sex differences have been reported by Wertheimer (1954a, 1954b) in both visual and kinesthetic after-effects, and schizophrenics appear to be less satiable than normals in both modalities (Wertheimer, 1954b, 1955). By contrast with Wertheimer's group, our samples, as well as Rich's, consisted exclusively of presumably normal males. It should be noted, however, that Wertheimer (1955) was able to get positive association between day-to-day changes in the two modalities in each of three normal *S*s tested for six to 13 days.

Our results with the visual task in the elderly group are similar to those of Rich in that correlations with age are low and negative. It is possible that the processes underlying decrease in susceptibility to visual after-effects do not become effective until late in senescence, although such an inference must remain quite tentative until it can be based on better evidence than the extremely low and mostly non-significant correlations obtained in the two studies.

It is possible that our inability to confirm Rich's inverse correlations between kinesthetic after-effects and age in a senescent group arises from differences in technique. Rich modelled his procedures after those of Klein and Krech (1952) rather than those of Köhler and Dinnerstein. Surprisingly, what appeared to be minor differences in technique may indeed be critical. In the Klein-Krech paradigm, the right hand inspects a wide strip, and matches are made between a standard strip presented to the right hand and a continuously graded scale presented to the left; matches are made in the ascending direction exclusively. In a technique which Wertheimer (1954) adapted from Köhler and Dinnerstein, the right hand inspects a wide strip and the left hand a narrow one simultaneously; alternating ascending and descending matches are made between a medium strip presented to the left hand and a discretely graduated side presented to the right hand. Wertheimer (personal communication) has found positive one-week, repeat-reliability coefficients for measurements with either technique; but when he correlated after-effects obtained using the one technique with those obtained using the other a week later, the correlation coefficients were negative. If differences in technique turn out to be critical, caution will clearly have to be exercised in generalizing inferences from after-effect experiments.

E. SUMMARY AND CONCLUSIONS

Visual and kinesthetic after-effects at 0, 20, 40, 60, 90 and 120 seconds after 60-second inspection periods were measured in senescent and young adult men.

1. No significant differences were obtained between the two groups. This is counter to prediction on the basis of the assumption that susceptibility to after-effects is a direct correlate of the efficiency of CNS functioning.

2. Inter-modality correlations were uniformly negative and mostly nonsignificant. This fails to support the notion of a general personality or physiological basis for susceptibility to after-effects across modalities.

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The Journal of Genetic Psychology, 1962, **100**, 93-111.

BELIEFS ABOUT "OLD PEOPLE": A COMPARATIVE STUDY OF OLDER AND YOUNGER SAMPLES*[1]

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In two previous reports (Golde and Kogan, 1959; Kogan and Shelton, 1961), a sentence completion procedure for assessing attitudes toward old people is described. The instrument was developed for two reasons. *First*, we reasoned that the use of objective attitude items in the present area (Tuckman and Lorge, 1953; Kogan, 1961a; Kogan, 1961b), while yielding information of considerable value, was too restrictive to provide a thorough picture of the present belief and attitude domain. A sentence completion procedure permits the subject to select his own set of response categories (within the limits imposed by any given sentence stem). Such a procedure was expected to yield response material of a depth and richness that would substantially supplement data obtained from the act of agreeing or disagreeing with a set of objective items. Rotter (1951) among others has emphasized the value of the sentence completion method for the indirect assessment of social attitudes. *Second*, it was possible within the sentence completion format to construct a matched set of control items with the referent "most people" (or a reasonable equivalent thereof) substituted for the "most old people" referent in the sentence completion stems. Accordingly, we could test empirically whether beliefs about "old people" were any different from comparable beliefs about "people in general." A similar control could be employed, of course, with structured attitude items, but such items would often have an extremely far-fetched quality in the present context. Consider, for example, the difficulty of constructing a matched control for the item "It would probably be better if most old people lived in residential units with people of their own age" taken from Kogan (1961a).

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* Received in the Editorial Office on March 20, 1961, and given prior publication in accordance with our policy regarding manuscripts on the subject of aging.

[1] This study was supported in part by the National Institute of Mental Health, United States Public Health Service, under Research Grant M-1867, and was conducted under the auspices of the Age Center of New England, Inc. The authors wish to thank Malcolm J. Arth, Peggy Golde, Jane Livermore, Mark McGrath, John M. Robinson, Judith W. Stephens, and Ruth Taliaferro for assistance in collection and analysis of the data, and Bernard W. Harleston and Mr. Robinson for making classes available.

As a first step in the research application of the sentence completion instrument, we tested the hypothesis that there would be no difference in characteristics attributed to "old people" and "people in general." For samples of young adults (Golde and Kogan, 1959) and older persons (Kogan and Shelton, 1961), the null hypothesis was rejected for the large majority of sentence completion stems used in these earlier studies. Obviously, individuals of diverse ages distinguish "old people" from the general population along a number of dimensions. It is well worth noting that a simple favorability-unfavorability dimension does not begin to do justice to the complexity of the data.

Having demonstrated, then, that "old people" are cognitively differentiated from the general population, we now feel prepared to undertake a direct comparison of older and younger adults regarding their respective beliefs about "old people." Again, we shall use the sentence completion procedure described in our previous work.

A. METHOD

1. *The Instrument*

Twenty incomplete sentence stems were used (Table 1). These were intended to reflect, among other factors, the emotions, physical attributes, interpersonal qualities, and values attributed to "old people."

2. *Subjects*

The older sample consisted of 46 men and 55 women, all volunteer members of The Age Center of New England, Inc., a non-profit gerontological research organization in Boston, Mass. These *S*s ranged in age from 50 to 92, with a mean of approximately 70 years. They were in apparently good health, non-institutionalized and generally average to superior in education and intelligence. Wechsler-Bellevue intelligence data on a comparable sample drawn from The Age Center of New England, Inc., may be found in Wallach and Kogan (1961). Mean scores were highly similar to those observed for college samples.

Younger *S*s, 44 males and 49 females, were enrolled in undergraduate psychology courses at Boston University and Tufts University.

3. *Procedure*

The sentence completion form was administered individually to the older *S*s and during class periods to the younger *S*s. The instructions to the test specified that the *S* complete the sentences with the "first thing that comes into your mind."

TABLE 1

Item No.	Sentence stems	Scoring categories	Per cents of responses		Item chi-squares and category *CR*'s	*p*	Per cents of responses		Item chi-squares and category *CR*'s	*p*
			Older men	Younger men			Older women	Younger women		
1.	Most old people's friendships are . . .	A. Enduring, deep	20.9	18.9			31.4	30.0		
		B. Impermanent, shallow	9.3	5.4			2.0	5.0		
		C. Positive adjectives not included above	53.5	29.7			39.2	20.0	1.97	.05
		D. Negative adjectives not included above	0.0	5.4			7.8	7.5		
		E. *S* cites reasons for or conditions of friendship	4.7	13.6			3.9	27.5	2.90	.01
		F. With people of own age group	9.3	18.9			5.9	5.0		
		G. Past, concluding	2.3	8.1			9.8	5.0		
			$N = 43$	$N = 37$	9.86	.20	$N = 51$	$N = 40$	12.76	.05
2.	In general, old people need . . .	A. Assistance (e.g., help, care)	2.5	25.0	2.63	.01	2.0	12.2		
		B. Security (e.g., personal well-being)	0.0	0.0			2.0	14.3		
		C. Positive response from others (e.g., love, companionship)	75.0	57.5			76.0	67.4		
		D. Interests and activities	12.5	12.5			12.0	6.1		
		E. Material things (e.g., money)	10.0	5.0			8.0	0.0		
			$N = 40$	$N = 40$	8.95	.05	$N = 50$	$N = 49$	13.41	.01
3.	When I am with an old person, I . . .	A. Negative feelings (e.g., discomfort, tension)	10.4	16.1			10.4	23.8		
		B. Positive feelings (e.g., well-being, ease)	25.0	16.1			18.7	2.4		

TABLE 1 (*continued*)

Item No.	Sentence stems	Scoring categories	Per cents of responses Older men	Per cents of responses Younger men	Item chi-squares and category *CR*'s	*p*	Per cents of responses Older women	Per cents of responses Younger women	Item chi-squares and category *CR*'s	*p*
		C. Passive, subordinate response (e.g., respect)	17.5	19.4			8.3	11.9		
		D. General outgoing response (e.g., converse, listen)	37.5	35.5			56.3	52.4		
		E. Awareness of age	10.0	12.9			6.3	9.5		
			$N = 40$	$N = 31$	1.35	.90	$N = 48$	$N = 42$	8.47	.10
4.	One of the greatest fears of many old people is . . .	A. Death or dying	8.9	34.2	2.58	.01	4.7	40.8	3.75	.01
		B. Loneliness, isolation	15.6	23.7			32.6	27.3		
		C. Rejection, being disliked	6.7	15.8			14.0	11.4		
		D. Anxiety response (e.g., general insecurity)	2.2	2.6			4.7	0.0		
		E. Loss of powers, illness	17.8	15.8			18.6	11.4		
		F. Dependence	22.2	2.6	2.30	.05	4.7	9.1		
		G. Lack of money, financial insecurity	26.7	5.3	2.30	.05	20.9	0.0	2.85	.01
			$N = 45$	$N = 38$	20.36	.01	$N = 43$	$N = 44$	25.40	.01
5.	Old people's appearance . . .	A. Important, emphasis on maintaining appearance	18.6	0.0	2.36	.05	20.8	2.8	2.10	.05
		B. Denial or qualification of importance	0.0	8.3			0.0	5.6		
		C. Index of kind of person	11.6	0.0			8.3	13.9		
		D. Positive descriptive adjectives	25.6	13.9			27.1	11.1		

TABLE 1 (*continued*)

			Per cents of responses		Item chi-squares and		Per cents of responses		Item chi-squares and	
Item No.	Sentence stems	Scoring categories	Older men	Younger men	category *CR*'s	*p*	Older women	Younger women	category *CR*'s	*p*
		E. Negative descriptive adjectives	30.2	44.4			14.6	44.4	2.79	.01
		F. Varies, differs	11.6	5.6			14.6	8.3		
		G. Age related responses	2.3	27.7	2.93	.01	14.6	13.9		
			$N = 43$	$N = 36$	26.80	.01	$N = 48$	$N = 36$	18.35	.01
6.	. Old people tend to resent . . .	A. Younger people	0.0	28.5	3.15	.01	6.3	25.6	2.26	.05
		B. Intrusion, interference, dominance	10.8	8.6			29.1	23.3		
		C. Rejection, lack of concern	16.4	8.6			16.7	2.3	1.95	.06
		D. Criticism	10.8	5.7			12.5	7.0		
		E. Condescension, being patronized	27.0	22.9			12.5	18.6		
		F. Change or novelty	2.7	20.0			8.3	13.9		
		G. Reference to age or agedness	24.3	0.0	2.76	.01	4.2	7.0		
		H. Advice	8.1	5.7			10.4	2.3		
			$N = 37$	$N = 35$	25.70	.01	$N = 48$	$N = 43$	15.01	.05
7.	In our society, grandparents often are . . .	A. Over-indulgent	7.5	3.1			0.0	5.7		
		B. Undervalued, neglected	42.5	59.3			53.7	45.7		
		C. Honored, respected, cherished	17.5	9.4			4.9	20.0		
		D. Positive traits not included above	15.0	9.4			21.9	8.6		
		E. Negative traits not included above	5.0	6.3			12.2	11.4		
		F. Used as helpers (e.g., babysitters)	12.5	12.5			7.3	8.6		
			$N = 40$	$N = 32$	2.97	.80	$N = 41$	$N = 35$	8.41	.20

TABLE 1 (*continued*)

Item No.	Sentence stems	Scoring categories	Per cents of responses		Item chi-squares and category *CR*'s	*p*	Per cents of responses		Item chi-squares and category *CR*'s	*p*
			Older men	Younger men			Older women	Younger women		
8.	Sex for most old people . . .	A. Negligible or unimportant, past, no longer interesting	66.7	75.7			73.5	68.2		
		B. Negative, distasteful, connotation, taboo	20.5	5.4			6.1	9.1		
		C. Declined in importance, but still exists	10.2	16.2			6.1	18.2		
		D. "Don't know" response	2.6	2.7			14.3	4.5		
			$N = 39$	$N = 37$	4.02	.30	$N = 49$	$N = 44$	5.49	.20
9.	Most of the old people I have known . . .	A. Responses in terms of *S*'s relation to others	4.9	26.3	2.34	.05	12.0	16.7		
		B. Positive descriptive adjectives	75.6	50.0	2.36	.05	74.0	66.7		
		C. Negative descriptive adjectives	17.1	18.4			10.0	13.9		
		D. Demographic descriptive adjectives	2.4	5.3			4.0	2.8		
			$N = 41$	$N = 38$	8.44	.05	$N = 50$	$N = 36$	.85	.90
10.	For the old man, work is often . . .	A. Tedious nature of work	13.1	10.3			1.9	11.4		
		B. Difficult nature of work	23.9	20.5			13.4	18.2		
		C. Psychological importance, value, pleasantness of work	56.5	51.3			73.2	68.1		
		D. Unavailability of work	6.5	17.9			11.5	2.3		
			$N = 46$	$N = 39$	2.70	.50	$N = 52$	$N = 44$	6.63	.10

TABLE 1 (*continued*)

Item No.	Sentence stems	Scoring categories	Per cents of responses Older men	Per cents of responses Younger men	Item chi-squares and category *CR*'s	*p*	Per cents of responses Older women	Per cents of responses Younger women	Item chi-squares and category *CR*'s	*p*
11.	Old people, by and large, hope . . .	A. Peace, happiness, contentment, good things in general	30.6	22.5			32.2	8.1	2.40	.05
		B. Longevity and health	27.8	25.8			15.2	27.0		
		C. Success, money, achievement, fame	0.0	6.5			0.0	13.5		
		D. Independence, usefulness	11.1	12.9			28.8	16.2		
		E. Not to be rejected, love, companionship	11.1	25.8			13.6	29.8		
		F. Financial security, comfort	19.4	6.5			10.2	5.4		
			$N = 36$	$N = 31$	6.89	.25	$N = 49$	$N = 37$	18.48	.01
12.	When a woman becomes old . . .	A. Loses attractiveness	8.8	12.5			11.6	21.1		
		B. Anxiety over loss of attractiveness	8.8	12.5			2.3	5.3		
		C. Negative emotional aspects of age	38.3	31.2			27.9	39.5		
		D. Positive emotional aspects of age	23.5	15.6			9.3	5.3		
		E. Changing family relationships, home relationships	5.9	6.3			7.0	2.6		
		F. Maintaining activities and interests	0.0	3.1			27.9	13.1		
		G. Needs love, understanding, companionship	5.9	9.4			7.0	2.6		
		H. Appropriateness of outlook for behavior and age	8.8	9.4			7.0	10.5		
			$N = 34$	$N = 32$	2.51	.95	$N = 43$	$N = 38$	6.77	.50

TABLE 1 (*continued*)

Item No.	Sentence stems	Scoring categories	Per cents of responses Older men	Per cents of responses Younger men	Item chi-squares and category *CR*'s	*p*	Per cents of responses Older women	Per cents of responses Younger women	Item chi-squares and category *CR*'s	*p*
13.	The thing I like best about old people . . .	A. Kindness	10.5	11.4			6.0	16.7		
		B. Serenity	13.2	11.4			14.0	13.9		
		C. Gaiety, humor	7.9	5.7			2.0	5.5		
		D. Intelligence, wisdom, and related cognitive qualities	21.1	45.8			38.0	27.8		
		E. Social interaction qualities	28.9	11.4			16.0	8.3		
		F. Reminiscence	10.5	11.4			10.0	19.5		
		G. Courage, determination, perseverance	7.9	2.9			14.0	8.3		
			$N = 38$	$N = 35$	7.13	.50	$N = 50$	$N = 36$	6.56	.50
14.	Many old people think the younger generation . . .	A. Foolish, wild, "going to the dogs"	75.6	65.7			91.2	77.5		
		B. Positive traits or circumstances (e.g., more opportunity)	14.6	3.1			4.4	12.5		
		C. Comparison with previous generation	9.8	31.2	2.00	.05	4.4	10.0		
			$N = 41$	$N = 32$	7.06	.05	$N = 46$	$N = 40$	3.21	.20
15.	The thing I like least about old people . . .	A. Controlling, interfering qualities	9.7	5.6			2.4	0.0		
		B. Rigid, prejudiced qualities	19.3	25.0			14.6	42.2		
		C. Irritability, complaining	35.5	16.6			31.8	23.7		
		D. Garrulousness, talking of past, repetitiveness	6.5	8.4			24.4	13.1		
		E. Disinterest, pessimism, indifference	16.1	16.7			7.3	2.6		

Table 1 (*continued*)

Item No.	Sentence stems	Scoring categories	Per cents of responses: Older men	Per cents of responses: Younger men	Item chi-squares and category *CR*'s	*p*	Per cents of responses: Older women	Per cents of responses: Younger women	Item chi-squares and category *CR*'s	*p*
		F. Physical and mental decline, handicaps	12.9	22.2			4.9	7.9		
		G. Unattractive appearance, untidyness	0.0	5.5			14.6	10.5		
			$N = 31$	$N = 36$	5.55	.50	$N = 41$	$N = 38$	9.44	.20
16.	One of the greatest pleasures of old people is . . .	A. Companionship, love	40.6	10.5	2.74	.01	36.9	9.1	3.12	.01
		B. Leisure activities, recreation	8.1	5.3			15.2	13.6		
		C. Reminiscing	21.6	23.6			19.6	22.7		
		D. Feeling useful, needed	2.7	7.9			10.9	2.3		
		E. Interest in family	21.6	39.5			8.7	47.8	4.14	.01
		F. Talking	5.4	13.2			8.7	4.5		
			$N = 37$	$N = 38$	11.03	.06	$N = 46$	$N = 44$	23.04	.01
17.	For many old people, death . . .	A. Feared, frightening	15.8	26.5			7.8	29.6	2.50	.05
		B. Positive (e.g., not feared, welcomed)	44.8	38.2			27.5	25.0		
		C. Inevitable, accepted	15.8	14.7			19.6	20.4		
		D. Escape, release	23.6	20.6			45.1	25.0	2.04	.05
			$N = 38$	$N = 34$	1.26	.75	$N = 51$	$N = 44$	8.95	.05
18.	When an old person I do not know sits down next to me on a train or bus, I . . .	A. No special behavior or feelings (e.g., remain silent, ignore)	20.5	45.3	2.46	.05	17.6	36.6	2.06	.05
		B. Interest in other (e.g., observe, talk)	75.0	47.6	2.61	.01	80.4	56.1	2.52	.05
		C. Feelings of strain or withdrawal	4.5	7.1			2.0	7.3		
			$N = 44$	$N = 42$	6.92	.05	N = 51	$N = 41$	6.55	.05

Table 1 (*continued*)

Item No.	Sentence stems	Scoring categories	Per cents of responses Older men	Per cents of responses Younger men	Item chi-squares and category *CR*'s	*p*	Per cents of responses Older women	Per cents of responses Younger women	Item chi-squares and category *CR*'s	*p*
19.	To be friends with an old person is . . .	A. Difficult, other negative qualities	9.1	17.8			5.9	19.0		
		B. Rewarding, other positive qualities	65.9	76.4			82.4	69.1		
		C. Emphasis on reciprocity in the relationship	9.1	2.9			3.9	4.8		
		D. Helpful to others, duty, kind thing to do	15.9	2.9			7.8	7.1		
			$N = 44$	$N = 34$	5.67	.20	N = 51	$N = 42$	3.96	.30
20.	Most old people's lives are . . .	A. Negative (e.g., lack stimulation, happiness)	51.4	64.1			55.8	75.0		
		B. Positive (e.g., happy, fulfilled)	29.7	20.5			25.0	17.5		
		C. Complicated, has its problems	8.1	0.0			9.6	0.0		
		D. Emphasis on the past	10.8	7.7			3.8	0.0		
		E. Individual's responsibility (e.g., what they make it)	0.0	7.7			5.8	7.5		
			$N = 37$	$N = 39$	7.39	.20	$N = 52$	$N = 40$	7.38	.20

4. *Coding*

The empirically derived scoring categories applied to older *S*s' responses in the Kogan and Shelton (1961) paper were also used in the present study. Some of these categories were omitted from the present investigation, however, since they were relevant only to the "people in general" sentence stems. Data were coded by four independent judges, two of whom scored the responses for the older sample while the other two coded the younger *S*s' responses.[2] When responses contained more than a single idea, judges were instructed to code each separately, alphabetizing them in order of appearance. Since the authors intended that scoring categories be mutually exclusive, judges were instructed to code each response idea under one category only.

For the older *S*s' responses, interjudge agreement for the twenty items ranged from 73 per cent to 97 per cent, with an average of 86 per cent. Interjudge agreement for the younger *S*s' responses ranged from 58 to 90 per cent, with an average of 75 per cent. Disagreements between judges were resolved by presenting the discrepant categorizations to another independent judge, who decided which category was most appropriate.

5. *Statistical Comparison of Age Groups*

Since some *S*s emitted multiple responses to particular sentence stems, statistical tests between the age samples could not be carried out effectively unless the between-group response frequencies were equalized. Accordingly, where an *S* responded to a particular sentence stem with more than one idea, another judge coded the entire response under the one category that best seemed to reflect the meaning of the response in question.

A "miscellaneous" category for each item was omitted in the statistical analysis. This accounts for variations in *N* in Table 1. Differences between younger and older *S*s were tested with chi-square. When sample differences for an item were significant at or beyond the .05 level, critical ratios were computed for the various categories specific to that item. In this manner, categories contributing most heavily to the chi-square value can be readily identified.

The sexes were treated separately in the analysis, thus permitting an examination of age differences within each sex group.

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[2] In the ideal case, response protocols of older and younger *S*s would be randomly assigned, so that judges would never know whether they were scoring the protocol of an older or younger *S*. In the present case, the responses of older *S*s had been scored before the younger *S*s' data had been collected. The use of two judges for both older and younger *S*s, however, should provide a fairly effective safeguard against scorer bias.

B. Results and Discussion

Table 1 presents the sentence stems and their respective scoring categories. Also listed are the response percentages for each category, the chi-square value shown adjacent to the N for each item, and (where appropriate) critical ratios for categories yielding p values at the .05 level or better.

Chi-squares significant at or beyond the .05 level for both males and females were obtained for six of the twenty sentence stems (Nos. 2, 4, 5, 6, 16, and 18).[3] In addition, younger and older males differed significantly in their responses to items 9 and 14, while items 1, 11, and 17 elicited significantly different responses from older and younger women. A total of nine items did not evoke significantly different responses from older and younger *S*s.

A brief discussion of those items yielding significant differences follows below. Discussed first are the six items with significant differences for both sexes.

2. *In general, old people need* . . . . The younger *S*s (especially males) more frequently cite "assistance" as a major need of "old people." It will be noted that the majority of both young and older *S*s considered a "positive response from others" as a dominant need in the present case.

4. *One of the greatest fears of many old people is* . . . . Younger *S*s more frequently consider "death or dying" a greatest fear, while older *S*s more often stress "lack of money" and "financial insecurity." In addition, older males more often cite "dependence" as a greatest fear of "old people." It is evident on the basis of the present data that a greater proximity to death does not necessarily imply an increasing fear of death at a conscious level. One cannot rule out the possibility, of course, that a denial process is at work among the older *S*s which serves to suppress any conscious concern with death.

Of considerable interest is the relative infrequency of "financial insecurity" responses on the part of the younger *S*s. This is especially surprising in the light of recent publicity in the United States regarding older people's alleged difficulties in meeting medical expenses. It will be further noted that money was rarely mentioned by younger *S*s as a need of "old people" in item no. 2. The relatively low salience of the aged's financial concerns for younger *S*s and the corresponding emphasis upon the fear of death on the part of these *S*s points up the cross-generational differences distinguishing this problem area. Obviously, if older individuals are preoccupied with the termination of life, younger *S*s can afford to de-emphasize the urgency of everyday needs. Correspondingly, where these needs are of uppermost concern, as is the case for many older persons, one might well expect a lesser conscious preoccupation with death.

That "dependence" as a greatest fear yielded a significant difference for males and not for females is consistent with the sharper role changes experienced by males as a consequence of the retirement experience. The finding is also relevant to other results (Kogan and Wallach, 1961) respecting the differential impact of aging for males and females in our society.

5. *Old people's appearance* . . . . Both older males and females stress the importance of appearance, younger *S*s citing this category very rarely. Younger women more frequently describe "old people's" appearance in negative terms relative to their older counterparts, while younger men mention various age-related characteristics (e.g., wrinkled) more often than do older men. The results for the present item appear reasonably consistent. Given the devaluation of old people's appearance by younger persons (particularly young women), it behooves the older individual to take special pains to maintain a respectable, if not necessarily youthful, appearance. The greater discrepancy between the young and older women relative to the discrepancy for men serves to emphasize the value attached to youthful appearance for women in our society.

6. *Old people tend to resent* . . . . Young *S*s of both sexes more frequently cite "younger people" as the object of old people's resentments. On the other hand, older female *S*s refer to "rejection" and "lack of concern" more often than do younger women, while older men manifest a greater incidence of "reference to age" responses relative to the younger males of the study. Thus, while the responses of many of the younger *S*s are diffuse in their feeling that old people resent younger individuals as a class, the older *S*s themselves are more likely to cite specific grounds for resentment. In the case of the older male, there appears to be a high degree of sensitivity with respect to one's status as an old person. Implicit in these specific resentments, of course, is the strong likelihood of their being instigated by younger persons. In certain respects, then, younger *S*s are accurate in their assessment of who is responsible for "old people's" resentments.

16. *One of the greatest pleasures of old people is* . . . . The significant age difference for the present item is largely contributed by the "companionship, love" and "interest in family" categories. It can be seen that older *S*s more frequently employ the former, while younger *S*s tend to favor the latter. These results are highly supportive of Cumming's *et al.* (1960) views regarding a disengagement process in aging, and run counter to the observations of

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[3] For item no. 16, the chi-square for males was 11.03. With 5 df, a chi-square value of 11.07 is significant at the .05 level.

Linden (1956) and Townsend (1957), both of whom emphasize the closer family relationships of the later years of life. The present sample of older *S*s, of course, comprises a healthy, independent, urban group and is biased toward the higher socio-economic levels. It is in such a group that disengagement from the family is especially likely. Such disengagement, however, does not imply an absence of affectional needs, as the present findings demonstrate. That such needs cannot always be gratified outside of the family setting probably constitutes one of the major problems of aging.

18. *When an old person I do not know sits down next to me on a train or bus, I . . . .* Under the circumstances stated in the item older *S*s manifest a greater interest in the "old person" than do younger *S*s. The latter, by contrast, indicate that they would remain quite indifferent in the situation. Since earlier work (Golde and Kogan, 1959) has shown that younger individuals do manifest interest when the referent in the item is "a person" rather than "an old person," the present results emphasize the younger individual's wish to avoid direct personal contacts with older persons.

We consider next the items yielding a significant age difference for men.

9. *Most of the old people I have known . . . .* The findings are rather puzzling; young *S*s more frequently respond to the item in terms of specific relationships with older persons, while older *S*s are more prone to cite positive descriptive adjectives. No interpretation is offered for these findings, and in view of the magnitude of the nonsignificant difference observed for females, we suspect that sampling error may account for the observed age difference for males.

14. *Many old people think the younger generation . . . .* Younger males more frequently respond in terms of a belief that "old people" compare them with previous generations. The comparison, in the eyes of these younger *S*s, often reflects unfavorably upon them. The observed age difference in the present case seems less important than the striking similarity between old and young *S*s, male and female, in the generally negative tone of the responses.

Discussed next are the items yielding a significant age difference for women.

1. *Most old people's friendships are . . . .* Older women tend to describe such friendships in generally more positive terms, whereas younger females are more likely to cite particular reasons for or conditions of friendship. On the basis of our previous research and that of others (Golde and Kogan, 1959; Kogan and Shelton, 1961; Arth, 1954; Havighurst and Albrecht, 1953) we suspect that older *S*s' responses have wish-fulfilling aspects, while younger women are projecting their own friendship experiences upon older people.

11. *Old people, by and large, hope . . . .* Contributing most heavily to the statistical significance of the present item is the category specifying peace, happiness, etc. as the major hope. It is difficult to judge why older women are more prone than younger to use this very general category of response. Perhaps, it best encompasses a wide variety of more specific hopes. Or, alternatively, such responses may be evasive in character.

17. *For many old people, death . . . .* Female responses to the present item are consistent with those given to item no. 4. We are at a loss to account for the inconsistency observed for the male respondents. The reader is referred to item no. 4 for a discussion of the implications of the present item results.

The remaining items in Table 1, nine in all, did not yield significant overall age differences for male or female *S*s. These may represent areas or dimensions of experience where there is substantial agreement between younger and older *S*s in the image held of "old people." We shall not treat such age similarities in the present report, for the relevant data are available in Table 1.

A further consideration is the relatively small size of the samples employed, a matter of some importance in view of the substantial number of response categories required for most of the items. In short, sampling errors are likely to be of sufficient magnitude to produce spurious non-significance in some cases (Type II errors), just as some of the significant differences observed for one or the other sex subgroups appear to be cases of Type I errors. In sum, we believe that considerable confidence can be placed in age differences common to males and females, but recommend that other observed instances of age differences and similarities be considered tentative, pending further research on other samples.

C. Conclusion

Thus far, sentence completion responses have been treated in terms of specific items. In the present section, we shall ask whether any pattern of young-old subject differences can be discerned.

There are, in all, six items which yield a significant age difference for both men and women. A consideration of these differentiating items suggests a meaningful psychological syndrome of cross-generational conflict. While we do not wish to go so far as to infer the presence of cause-effect relations, there does appear in the responses of older *S*s a certain anticipation of the feelings of younger *S*s and an attempt to cope with these in some appropriate fashion. In this respect, the study's results are in support of a minority group theory of aging (Barron, 1953). The older individual emphasizes certain characteristics and values (and suppresses others) in order to achieve acceptance and ward off rejection by the dominant majority of younger persons.

Consider the following instances of complementary responses in the sentence completion data. Younger *S*s more frequently state that "old people" are in need of assistance; older *S*s more often cite dependence and financial insecurity as fears of "old people." In the matter of appearance, younger *S*s give more negative and age-specific descriptions; older *S*s, in complementary fashion, are more likely to insist that it is important for "old people" to maintain a good appearance and, further, more often indicate that "old people" resent references to their age. Finally, in the realm of interpersonal relations, older *S*s more frequently state that "old people" resent rejection and lack of concern and derive great pleasure from love and companionship. In a train or bus context, older *S*s more often indicate a passive or active interest in an unfamiliar older fellow passenger. By contrast, younger *S*s more often report that "old people" derive their greatest pleasure from their families and more frequently declare that younger individuals are resented by "old people." It is hardly surprising under these circumstances that younger *S*s do not display much interest in an old passenger on a bus or train.

The belief on the part of younger *S*s that "old people" resent them would seem to be of particular importance in the present case. For such a belief, whether or not in correspondence with actuality, implies that younger individuals are likely to respond to old people in a defensive manner. Such behavior might well serve to exacerbate an already delicate interpersonal situation, bringing about the very feelings of resentment in older persons that were attributed to them in the first place. Merton (1951) has aptly coined the term "self-fulfilling prophecy" to describe phenomena of this type.

In sum, the age differences observed in images and beliefs regarding "old people" are often suggestive of ambivalence, conflict, and inaccurate perception between generations. Younger individuals, perceiving that older persons resent them, attempt to avoid interpersonal contact and partially justify such avoidance by suggesting that older individuals are really more interested in their families and are preoccupied with death. The belief that "old people" are in need of assistance has a patronizing flavor in the present context, but such a belief may serve to assuage guilt feelings deriving from neglect of old people's emotional requirements.

Wide age differences between persons are obviously of major consequence in interpersonal relations. There are many fundamental differences between the old and the young in cultural values, attitudes, and interests (Pressey and Kuhlen, 1957). There are also some basic similarities (Kogan and Wallach, 1961). Whatever the differences and similarities, however, a first step toward improved human relations in the present area should be based upon altering the gross discrepancies between older and younger persons respecting their cognitions of "old people." This implies that the present state of complementarity, which tends to be perpetuated, must be upset in some way. If it be assumed that the images of "old people" reported by older *S*s represent a closer approximation to "reality" than do the comparable images of younger *S*s, then the latter are more likely to represent "distortions of reality." Of course, it is also possible that older *S*s may misjudge younger people's views regarding "old people." We do not have data specifically directed to this point. What our data do reflect, however, is a concern on the part of older *S*s of being set apart, considered different, or rejected. Since there is a basis for such feelings in the light of younger *S*s' responses, we must infer that the older *S*s are quite aware of the social context in which they find themselves. The parallel with the minority-group model is quite striking. From the standpoint of attitude change, then, principles and methods derived from the extensive experience of others in altering minority-group attitudes might be profitably applied in the present context (Katz and Stotland, 1959).

We shall conclude on a qualifying note. Our data do indicate many areas of agreement between older and younger *S*s, and, in many cases, highly positive sentiments about "old people" are expressed by the younger respondents. Nowhere in the data does one detect the extreme and harsh sentiments which often characterize racial and religious prejudice. Nevertheless, while underlying sentiments may be less extreme, we do feel that the dynamics of beliefs about old people are sufficiently similar to the ethnic prejudice case to warrant discussion in a minority-group context. Possibly, Drake's (1958) description of old people as a "quasi-minority" is most appropriate in the present circumstances.

D. SUMMARY

The present study inquires into the differences and similarities between older and younger *S*s in beliefs about old people. A sentence completion instrument was used to assess these beliefs. The instrument consisted of 20 items, each referring to a different aspect of old people's lives or tapping the *S*'s personal experience with old people. Older (46 males and 55 females) and younger *S*s (44 males and 49 females) were highly comparable in education and intelligence. Categories were derived from *S*s' responses to the items, these being scored by two independent judges. Interjudge scoring reliability was quite high.

The statistical significance of age differences for each item was tested with the chi-square technique. Where significance obtained, individual scoring cate-

gories within items were compared across age samples by means of critical ratios. A total of six items yielded significant age differences for both males and females. Two items achieved statistical significance for males only, and three items for females only. For nine items, no significant age differences were observed.

Examination of the items significant for both sexes revealed a considerable degree of complementarity in the beliefs about old people held by younger and older *S*s. It was further noted that the belief systems had become stabilized in a manner suggestive of majority-minority group conflict. The implications of these generalizations are considered in the paper, with particular reference to the problem of changing beliefs about old people.

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LIFE SPACE: ITS CONTENT AND TEMPORAL DIMENSIONS*

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A. Introduction

Among those who have presented a theoretical-conceptual scheme for the development of time perception, Lewin (15) diagrammed the degree of differentiation and the extension of life space at two developmental stages. As the child grows older, there is an increase of awareness with regard to what is contained in the psychological present and what is perceived as the psychological past and the psychological future. This general perception of the relations of past, present, and future is known as time perspective.

Lewin's point of view paralleled that of Frank (5), who stated that with the passage of time and with increased maturity, the time perspectives of the individual become altered; certain events are seen in a more remote focus and others in a more immediate focus. "We see the individual responding to present, immediate situation events (intraorganic or environmental) as point events in a sequence, the later or more remote components of which are the focus of conduct" (5, p. 295).

In this connection, Lewin suggested that the life space of an individual in a temporal dimension is symmetrical at both earlier and later stages of development, and that in the later stage the psychological past and future are each differentiated into near and distant components. The first objective of the present study, therefore, was to investigate the hypothesis that the ranges of time perspective increase in the directions of both the past and future in fairly equal proportions with advance in age.

Achievement of this goal, however, depended upon the definition of an appropriate method for measuring time perspective. Some investigators (2, 6, 10, 19) had used either an observation or questionnaire technique, combinations of the two, or projective techniques (7, 22). Ames (2) used an observation technique and a questionnaire to determine the development of time-sense in children up to the age of eight years. Her findings indicate that very young children live predominately in the present, but from the ages of two to three,

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* Received in the Editorial Office on March 10, 1960.

[1] Data for this study were abstracted from (4). The senior author wishes to acknowledge the guidance and assistance of Professor Robert J. Havighurst in planning the study.

the child develops a concept of a past, a present, and a future, with greater emphasis on the future than on the past. Ames' technique for determining emphasis is one of simple item count, i.e., she fails to consider the possible weight or significance of each item. However, the difficulty in determining relative importance of items with children of her population age must be recognized. Therefore, an interview form was designed with the objective of obtaining a more appropriate realization of the differential importance an individual places upon each of the time divisions.

However, attainment of this goal was merely the necessary preliminary to the critical objective of exploring the roles of age and sex as factors influencing the development and characteristics of time perspective. The third objective of this study, then, was to trace the development and modification, through five age-levels, of the importance ascribed by individuals to each of the four time divisions (Distant Past, Near Past, Near Future, and Distant Future). The two near categories (*NP, NF*) were arbitrarily defined as reported experiences which had just occurred or were to occur in a day or two, respectively, as opposed to the importance attached to events which had occurred more than two days past (*DP*) or were to occur two days or more in the future (*DF*). The interview form thus permitted an analysis of the differential importance ascribed to the time divisions.

In addition, it has been suggested that feeling states surrounding events which have occurred in the past tend to influence the extent of memory for those events (12, 17, 20). It might be assumed also that such feeling states would tend to influence the selective awareness for anticipated events. Thus, feeling tone was introduced as another variable. Finally, an attempt was made to analyze differences in importance ascribed to (emphasis on) the content of the life space.

In general, the objectives of this study were: (*a*) to develop an instrument which would measure the emphasis on each of the time divisions, as associated with feeling tone and content; and (*b*) to analyze the influence of age and sex as factors in the structure and content of the time perspectives.

B. METHOD

1. *Subjects*

Of the 140 *S*s selected from the general population in and around Chicago, 20 *S*s were assigned to each of seven groups: males 9½ to 11½ years (10M) and a similar group of females (10F); males 15½ to 17½ years (16M) and a similar group of females (16F); males 24 to 27 years (25M); males 34 to 39 years (35M); and males 60 to 69 years (65M).

An attempt was made to keep *S*s within each group comparable in relation to income level and occupation status. *S*s were divided into two occupational categories: (1) professional and semi-professional workers, proprietors, and managers, and (2) clerical-sales, craftsmen, foremen, and semiskilled workers. There were 65 *S*s in the first category and 75 in the second with almost parallel distribution in each of the groups.

2. *Procedure*

Each *S* was required to list his thoughts and conversations of the past week or two on a specially prepared interview form. It was assumed that any *S* who listed as many as 40 items would be giving a representative sample of thoughts and conversations which actually did take place within the stated time-period. In an interrogation period following the interview, *S* was instructed to rate each item as to the importance, i.e., very important (*VI*), important (*I*), not important (*NI*), it held for him at the time the thought occurred or conversation was held. Further, *S* had to characterize each item as *plus* (+) if his reaction to the item at the time of occurrence was pleasant, *minus* (—) if his reaction was unpleasant, and *zero* (0) if his reaction was one of indifference.

In a second interrogation period, *S* was required to think back to the occurrence of each thought or conversation and determine its temporal focus. That is, he was to label each item either distant past (*DP*), if the focus was upon an event which took place more than two days in the past; near past (*NP*), if the focus was upon an event which took place within two days previous to the occurrence of the thought; near future (*NF*), if the focus was upon an event which was to take place within the next two days; or distant future (*DF*), if the focus was upon an event which was to take place more than two days in the future. *S* was reminded to use the time at which the thought or conversation took place as a reference point for its temporal focus. If at any time *S* stated that more than one of these labels applied, he was asked to enter the one which best characterized the item.

One of the investigators then classified the items in terms of their content. Each item was placed in only one content category. When an item seemed to belong to more than one category, it was entered under the one which seemed to characterize it best. The following eleven categories, modifications of those given by Mooney (18) in his various Problem Check Lists, were selected because they seemed to cover and to differentiate the large variety of items most adequately.

1. *Health and physical development* (*HP*)—This category included those

items which centered around thoughts of physical status, illness, deformities, and energy, and also thoughts of physical aspects of the environment (e.g., temperature). These thoughts were of a personal nature and did not deal with concerns over those same conditions in others.

2. *Personal appearance* (*PA*)—Thoughts dealing with personal appearance, exclusive of size, deformity, and other aspects of physical status, were included in this category. Expenditures of money for clothes, cosmetics, and cleanliness were also included.

3. *Personal-psychological* (*PP*)—The items entered under this category involved statements which were clearly related to feelings of adequacy or inadequacy as a person in areas other than education, work and courtship, sex and marriage. In addition, reactions to situations and expectations which could not be specifically placed in another category were placed here (e.g., "Why am I so easily embarrassed?", "I must not be late so often.", "What will I be like five years from today?").

4. *Courtship, sex, and marriage* (*CSM*)—This category included items which dealt with relationships with the opposite sex at all levels except opposite-sex relationships which arise from the family situation other than husband-wife relationships.

5. *Home and family* (*HF*)—Included in this category were statements which dealt with situations, concerns, and relationships which arise primarily out of the home and the extended family, e.g., responsibilities for maintenance and routine of the home, items dealing with concern for the health and welfare of other family members and/or people living in the same household.

6. *Education* (*E*)—In this category are included items related to school subject-matter and to evaluation processes, i.e., grading and report cards.

7. *Vocational-economic* (*VE*)—Statements which dealt with choosing, planning, or practicing a vocation, and also full- or part-time work were included in this category. Also, problems and thoughts concerned with the need for money in general, earning, saving, and spending money without specific purpose mentioned were included.

8. *Relationships with people* (*RP*)—Items which dealt primarily with the close interaction between *S* and another person with the exception of items which belonged in categories 4 and 5, were placed in this category.

9. *Social-recreational* (*SR*)—Items which dealt with companionship in an activity, group social activities, such as parties, celebrations, holidays, and hobbies were placed in this category.

10. *Citizenship, politics, and community* (*CPC*)—Statements in this category included those indicating an interest in, or reaction to, local, national, or international conditions as well as an awareness of the functions of civic agencies.

11. *Morals, ethics, and religion* (*MER*)—In this category were included statements which clearly indicated a moral or ethical evaluation of the actions of *S* and of others. Religion, as used in this category, refers to relationships between *S*'s statements and philosophical aspects, institutional characteristics, and rituals of religious organizations.

Two judges, the senior author and a graduate student, read the directions for the classification of items into content categories and then classified 100 items selected at random from all groups in order to check the reliability of the placing of items in the content categories. The judges agreed in 92 per cent of the items, indicating that the definitions of the categories were rather clear and complete.

Below is a representative sample of items; each followed by the code for importance rating, feeling tone, time division, and content category, respectively.

10-year-old males				
1. Thought about saying my prayers.	I,	+,	NF,	MER
2. If I talk, I wouldn't get gym at school.	VI,	+,	NF,	PP
3. Don't want to wrestle with a girl.	I,	—,	NP,	CSM
10-year-old females				
1. I have been thinking about school and homework.	I,	+,	NP,	E
2. I was thinking about saving up for my Scout uniform.	VI,	+	DF,	VE
3. Talked about having a new dress.	I,	+,	NF,	PA
16-year-old males				
1. Being president of school class.	I,	+,	DF,	RP
2. Present for my mother on Thanksgiving day.	VI,	+,	NF,	HF
3. Thought about studying for test.	I,	—,	NF,	E
16-year-old females				
1. Talking about volley ball and how teacher told the girls to use front row and didn't do it herself.	NI,	O,	DP,	RP
2. Joe treats me very wonderful and I am happy with him.	VI,	+,	NF,	CSM
3. What marks I will get on my course book.	VI,	+,	NF,	E

25-year-old males

1. Whether my son will miss me when I'm gone. VI, —, DF, HF
2. If I'm capable of handling a married situation. VI, +, DF, CSM
3. Is this my correct vocation? VI, +, NF, VE

35-year-old males

1. Will the Russians move into Berlin? VI, —, NF, CPC
2. What causes my nausea? I, —, NP, HP
3. Possibilities of going into business for myself. NI, +, DF, VE

65-year-old males

1. How to plant garden next year. I, +, DF, HF
2. I don't like Chicago winters any more—too cold. I, —, NP, HP
3. It would be good for me to practice billiards after a good day's work. NI, O, NF, SR

In order to determine the extent to which the emphasis of one time division over another was a stable process, 11 *S*s completed the interview form for a second time. The interval between first and second interview was no less than three weeks and no longer than four months. A rank-order correlation of the emphasis given to each time and feeling tone division by each of the 11 *S*s indicated that the stability of time division, feeling tone emphasis was generally high. Correlations ranged from .21 to .97 with a median at .71. In addition, Teahan (23, 24), using this technique, found a high degree of internal consistency with respect to future references obtained from recent conversations (= .85).

C. Results

There were three feeling tone categories for each of the four time divisions. Each item within each of the 12 feeling tone-time division categories was given a weighted score of 3, 2, or 1, depending upon the importance rating, *VI*, *I*, *NI*, respectively, ascribed by *S* to the item.

In order to measure the extent of unanimity among the seven age-sex groups in the assignment of feeling tone-time division, the rank in emphasis given by each group to each of the 12 categories was determined (Table 1). The degree of concordance (13) was significant at less than the .01 level ($w = .76$, $\chi^2 = 58.5$).

TABLE 1
DEGREE OF CONCORDANCE BETWEEN GROUPS IN IMPORTANCE ATTACHED TO THOUGHTS OR EVENTS IN EACH FEELING-TONE TIME DIVISION

Group	Rank emphasis for each feeling-tone time division											
	DP +	DPO	DP —	NP +	NPO	NP —	NF +	NFO	NF —	DF +	DFO	DF —
10M	4	10	8	3	7	5	1.5	6	11	1.5	9	12
10F	8	12	10	3	9	5	1	6	4	2	11	7
16M	5	12	11	2	6	4	1	8	7	3	9	10
16F	7	12	11	4	10	3	1	8	5	2	6	9
25M	10	11	12	8	9	6	1	7	3	2	4	5
35M	9	12	8	4	11	5	2	6	3	1	10	7
65M	8	12	9	4	10	7	1	6	3	2	11	5
Mean	7	12	11	3	10	4	1	6	5	2	9	8
Per cent Emphasis	5	2	3	12	4	8	22	6	9	17	5	5

1. *Time Division-Feeling Tone*

Entries for each category were totalled and the per cent emphasis (importance) was obtained by converting each weighted score into a percentage value of the total emphasis. Combining the various scores yielded the per cent emphasis given to past or future, near or distant, and pleasant (+), unpleasant (—), or indifferent (0) feeling tone.

Separate χ^2 analyses of the number of cases in each group above and below the median per cent emphasis of the total population were computed to determine differences between groups in each of the categories. If χ^2 for a category resulted in $p \leqslant .10$, then χ^2 values for differences between pairs of groups were calculated. However, if $p > .10$, it was assumed that any differences between pairs of groups occurred by chance alone. Since extremes were being considered and random error was favored, $p \leqslant .01$ was required for significance between pairs of groups.

Table 2 summarizes the emphasis given by each group to each of the time divisions and feeling tones, and to various combinations of these. Groups differed significantly ($p \leqslant .10$) in per cent emphasis scores of neutral feeling tone in each of the four time divisions. Data also indicated a difference when the combined male and combined female groups at the two younger age levels (10 and 16) are compared. Boys tended to emphasize the neutral category more often than did girls. Groups also differed significantly in per cent emphasis on *DP*+, on total distant past and total distant future without regard to feeling tone, and on total negative without regard to time division. Although

TABLE 2
PER CENT EMPHASIS OF EACH GROUP ON TIME DIVISIONS AND FEELING TONES

Time division	Feeling tone	Group 10M	10F	16M	16F	25M	35M	65M
DP	Positive*	9	3	8	5	3	5	5
	Neutral*	4	1	2	2	2	3	1
	Negative	5	2	3	3	1	6	5
Total*		18	6	13	10	6	14	11
NP	Positive*	11	13	17	12	6	9	12
	Neutral*	5	3	8	4	5	5	3
	Negative	8	8	6	13	7	9	6
Total		24	24	31	29	18	23	21
NF	Positive	20	32	18	23	25	16	22
	Neutral*	6	5	7	4	7	8	7
	Negative*	4	11	6	7	10	10	14
Total*		30	48	31	34	42	34	43
DF	Positive	20	17	15	18	19	17	15
	Neutral*	5	2	6	6	8	5	2
	Negative	2	4	4	4	7	8	9
Total		27	23	25	28	34	30	26
Past		43	30	44	38	24	37	32
Future		57	70	56	62	76	63	68
Near		55	73	60	63	60	56	64
Distant		45	27	40	37	40	44	36
	Positive	61	65	59	57	52	48	55
	Neutral*	20	10	23	16	21	20	12
	Negative*	20	25	18	26	26	32	33

* Significant ⩽ .10 level.

a significant χ^2 was obtained for *DPO, NP+*, and *NF—* over-all, no significant differences between groups were found in these three categories.

2. *Content*

The degree of unanimity among the seven age-sex groups in the importance attached to each of the 11 content categories is presented in Table 3. The *w* coefficient of .59 ($\chi^2 = 41.2$) was significant at less than the .01 level. The extent of unanimity between groups on content emphasis was not as great as that for time division-feeling tone emphasis. The seven groups had a community of preference, but this was probably due to the fact that some of the content categories were broader than others and, thus, included more items.

The treatment of the data pertaining to content was identical in all respects to that followed in the analyses of time division-feeling tone data. Table 4 summarizes the per cent emphasis given by each group to each of the 11 content categories. Only two of the 11 content categories, Health and Physical Status, and Morals, Ethics, and Religion, failed to reach significance ($p > .10$).

TABLE 3
DEGREE OF CONCORDANCE BETWEEN GROUPS IN IMPORTANCE ATTACHED TO THOUGHTS OR EVENTS IN EACH CONTENT CATEGORY

	Rank emphasis for each content category										
Group	HP	PA	PP	CSM	HF	E	VE	RP	SR	CPC	MER
10M	8	10.5	5	10.5	2	3	6	4	1	9	7
10F	6	7	5	11	2	3	8	4	1	10	9
16M	7	9	8	6	3	2	5	4	1	10	11
16F	11	9	6	2	4	5	7	3	1	10	8
25M	8	9.5	9.5	6	3	5	1	4	2	7	11
35M	6	11	8	9	1	7	2	5	3	4	10
65M	6	10	7	9	3	11	1	4	5	2	8
Mean	7.5	11	6	9	2	5	4	3	1	7.5	10
Per cent Emphasis	4	3	5	6	16	10	12	12	23	7	3

Key:
HP—Health and physical status
PP—Personal-psychological
HF—Home and family
VE—Vocation-economic
SR—Social-recreational
MER—Morals, ethics, religion
PA—Personal appearance
CSM—Courtship-sex-marriage
E—Education
RP—Relationship with people
CPC—Citizenship, politics and community

TABLE 4
PER CENT EMPHASIS OF EACH GROUP ON EACH CONTENT CATEGORY

	Group						
Content	10M	10F	16M	16F	25M	35M	65M
Health & physical status	2	6	5	2	5	4	6
Personal appearance*	1	5	3	4	3	1	2
Personal-psychological*	5	7	5	8	3	3	4
Courtship, sex, and marriage*	1	1	6	17	7	3	2
Home and family*	17	21	11	13	11	24	13
Education*	3	2	8	6	21	22	26
Vocation-economic*	14	12	18	12	10	4	0
Relationship with people*	14	11	9	14	11	9	14
Social-recreational*	38	31	32	18	19	14	9
Citizenship, politics and community	2	1	2	3	7	14	9
Morals, ethics, and religion	2	2	1	4	2	2	4
Total	99	99	100	101	99	100	98

* Significant ⩽ .10 level.

Those categories (content and time division-feeling tone) which yielded significant differences between pairs of groups are shown in Table 5. It is apparent, for example, that 10-year-old males attach greater importance to social-recreational activities (SR) than 16-year-old females, but, on the other hand, that 16-year-old females attach greater importance to courtship, sex, and marriage (CSM) than 10-year-old males.

TABLE 5
PATTERN OF CATEGORIES YIELDING SIGNIFICANT DIFFERENCES BETWEEN PAIRS OF GROUPS[a]

High group	Low group						
	10M	10F	16M	16F	25M	35M	65M
10M		DP		SR	SR	E SR	E SR
10F	PA		HF		HF	PA E SR	PA E SR
16M	PA CSM	CSM DP+ NPO Neut.		SR	SR DP+ NP+	PA E SR NP+	PA E SR NPO
16F	PA CSM	CSM DFO			PP	PA PP E	PA CSM E
25M	PA CSM VE NFO	CSM NE CPC Neut.	VE CPC	VE NFO		PA E	PA CSM E
35M	VE CPC	VE CPC DP Neut.	HF CPC Neg	HF VE CPC	HF		HF
65M	VE CPC NF	VE CPC	VE CPC NF	VE			

[a] Age-sex groups along ordinate gave significantly higher scores than abscissa groups in categories entered in each cell ($p \leqslant .01$).

D. DISCUSSION

1. *Evaluation of the Interview Form*

Previous investigations of time perspectives have generally employed a direct question procedure (2, 6, 10, 11), or some form of projective device, i.e., sentence completion or the outcome of TAT stories (7, 14, 21, 22). These procedures grew out of techniques commonly used in personality study. However, the questionnaire procedure is prone to possible misinterpretation by the subject and tends to force a restricted range of response. Although not suffering from these deficiencies, the projective techniques seem more or less incapable of adequately sampling conscious motivational processes; they have more appropriate application in cases of neurotic *S*s who are not likely to reveal their motivations under direct questioning (1). In addition, the interpreter is compelled by the nature of his data to resort to subjective judgments in arriving at his conclusions. On the other hand, the technique described in this study, although used in a limited way, permits a very wide range of response, is not prone to misinterpretation by *S*, and has the added advantage of more adequately sampling the conscious facets of *S*'s personality. Furthermore, the completed interview form does not require the difficult intuitive assumptions of projective techniques. Therefore the interview form can and should be used to supplement information on personality evaluation obtained through direct or indirect procedures.

2. *Time Segments*

Figure 1 and the concordance coefficient (Table 1) indicate a consistency among groups in the relative emphasis assigned the various time divisions and feeling tones. The groups emphasized the near categories more than the distant. This finding is consistent with the suggestion that the psychological present (near categories) is more prominent in the life-space of an individual than either the psychological past or future (15). The groups emphasized the near future more than any other category. This finding within temporal dimensions parallels that of the goal-gradient studies which suggest that the impact of spatially near goal-objects is greater than that of spatially distant goal-objects (e.g., 9). The total future category received greater emphasis than did the total past. Since the past is in many respects more fixed than the future, it is natural to expect that the future consists of more possible items than the past.

The similarity of the oldest group (65M) to the younger groups tends to invalidate some prevalent misconceptions concerning the personality structure of the older person. Vischer (25), for example, reported that "the hopeful expectant attitude toward the future which is characteristic of the young is gradually, in the older person, exchanged for a retrospective view." However, the data of this study indicate that the older males cannot be differenti-

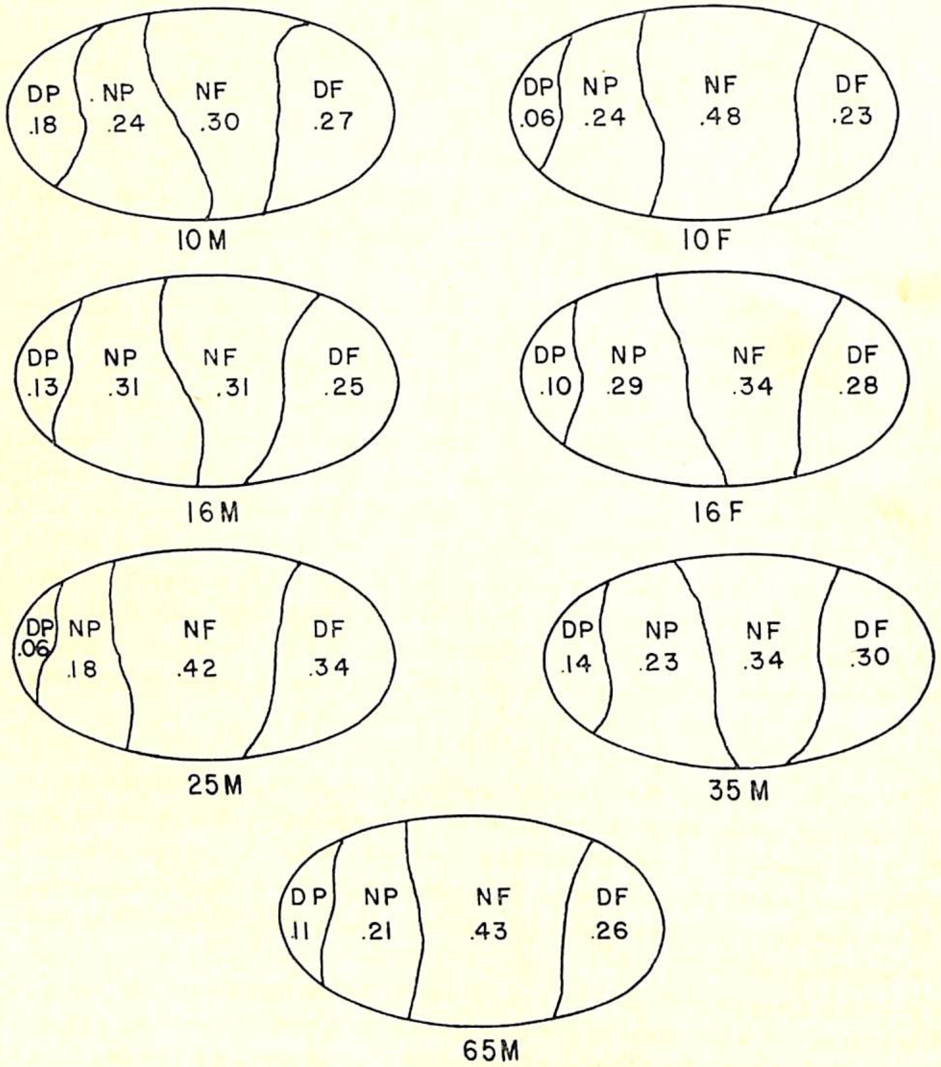

FIGURE 1.
TEMPORAL SEGMENTS OF LIFE SPACE FOR EACH AGE-SEX GROUP

ated from the other groups either in regard to greater emphasis on the past, or certainly, with regard to a less hopeful expectancy of the future. An explanation for the view that the older person lives in the psychological past more than does the younger person may be that since the older person has had more past experiences he might be stimulated by others to report these experiences. However, the interview form does not stimulate the individual to dwell on any one aspect of his psychological life-space but rather attempts to sample all aspects. When the report of the individual is taken in this fashion, the older person is not seen as more retrospective than the younger.

3. *Feeling Tone*

In each of the four time divisions the positive feeling tone received greater emphasis than either neutral or negative, in the ratios of 3:1 and 5:2, respectively. Thus we might assume that non-neurotic *S*s perceive a greater proportion of their experiences as pleasant. This is not only true with regard to past experience as reported previously (12, 17, 20), but even more so with regard to anticipated events. Of the total emphasis on the past, ⅓ is negative, while of the future only ⅕ is negative. This would seem to indicate that although repression may be operative in reporting past experiences, it is not as potent a factor as *antepression,* the inhibition against reporting anticipated negative experiences. Thus, it might be suggested that with non-neurotic *S*s a more-or-less hopeful, optimistic future orientation is maintained despite a willingness to regard a part of the past as unpleasant. It is suspected that the future is viewed less negatively than the past because the individual feels that he has more control over events yet to occur. An investigation of the effects of the phenomenon which we have called *antepression* is now in progress.

4. *Content*

The emphasis on content categories for the total population was ranked in the following order: 1. social-recreational; 2. home and family; 3. relationship with people; 4. vocational-economic; 5. education; 6. personal-psychological; 7.5. health, physical status; 7.5. citizenship, politics, and community; 9. courtship, sex, and marriage; 10. morals, ethics, and religion; 11. personal appearance.

Although there appeared to be some marked differences among the groups in the manner in which some of these categories were ranked, some generalizations may be made about the kinds of events which occupied the minds of the middle-class, urban population. The very limited attention which *S*s gave to broad aspects of community life and to problems of morals, ethics, and religion might be a basis for concern among community and religious leaders. It would seem that the little space occupied by these matters in the total life space of the individual would characterize the subject population as being very much self-centered or, at least, centered on self and a limited social environment. However, the emphasis on CPC by the three older groups is, in most instances, greater than that of the four younger groups (Table 5). It is likely that the younger individual's interest in social-recreational activities will shift in part with advance in age toward the less self-centered concern of citizenship and community. If this shift does occur, then there would be little basis for concern about the indifference of the younger person toward responsibilities of citizenship and community affairs.

A similar generalization may be made with regard to the shifting pattern of emphasis with age from concern with educational matters to emphasis on vocational and economic considerations. That is, education may be viewed as the vocation of the younger person.

The pattern of emphasis given to the categories of personal appearance and courtship, sex, and marriage tends to support widely-held opinions with reference to the usual concerns of preadolescents and adolescents. Thus, both female groups gave significantly more emphasis to personal appearance than 10M, 35M, and 65M. As would be expected, emphasis on CSM is highest in the 16-year-old females and they, along with the 16- and 25-year-old males, show significantly more concern in this category than either of the 10-year-old groups.

5. *Implications for Further Research*

Since the interview form seems to avoid the difficulties of both questionnaire and projective techniques, it should prove useful in analysis of personality patterns derived from surveying conscious life space. For example, individuals who deviate extremely from their age-sex group on various dimensions of the life-space (content, feeling tone, time-division emphasis), might be either socially maladjusted or, perhaps, better adjusted.

Several speculations have been made as to the relationship of time perspective to behavior. Lewin (16) suggested that the more mature individual tends to live in a more expanded life space temporally viewed, and that individual and group morale depend in large measure on appropriate time perspectives. Frank (5) suggested that the neurotic is unable to integrate past traumatic experience into present experience. Carl Rogers[2] has suggested that the effectiveness of psychotherapy might be measured in part by the extent to which the client decreases emphasis on the past and shows an increasing interest in the future. The present investigation attempted to define an appropriate method for measuring time perspectives and has established tentative

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[2] Personal Communication.

norms at various age levels. Further research is required to establish in definitive terms how the maladjusted person differs from the "normal" and in what ways various types of psychotic patients distort the time perspective.

Finally, various studies in cultural anthropology which deal with personal differences created by different kinds of cultural training might be made more meaningful if there existed some indication of the differences in time perspectives, in general, and with regard to particular content areas. Davis (3), for example, attributed greater "adaptive anxiety" (greater striving for anticipated rewards) to the middle class adolescent when compared to lower class youth. This hypothesis might be tested by means of the interview form used in this study. The results of this investigation showed that the emphasis on immediate future is high in all age groups. It might well be that a comparison of lower class youth with those of the middle class, would reveal, in the former, a greater emphasis on the near future and less emphasis on distant future. There might also be revealed differences in the integration of past experiences.

E. SUMMARY

One hundred-forty *S*s from a middle class, urban population, divided into seven age-sex groups, were asked to complete an interview form designed to elicit information concerning the content and temporal dimensions of the life-space. Each *S* was required to: (*a*) list his thoughts and conversations of the past week or two; (*b*) rate each item on a three-point scale as to its importance; (*c*) characterize each item as to feeling tone; and (*d*) label each item either distant past, near past, near future, or distant future. *S*s used the time at which the thought or conversation occurred as a reference point.

The seven groups, including 65M, agreed quite consistently in labelling items with respect to greater emphasis on the future over-all and the near future in particular, and with respect to greater emphasis on pleasant feeling tone. It was suggested that whereas repression operates to inhibit the reporting of past unpleasant experiences, antepression operates to inhibit the reporting of anticipated unpleasant experiences.

Marked differences appeared in the manner by which some of 11 content categories were ranked. However, certain generalizations were made concerning shifting patterns of content emphasis with age. Finally, implications for further research, particularly the use of the interview form as a diagnostic tool were discussed.

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The Journal of Genetic Psychology, 1962, **100**, 129-136.

CHILDREN'S CONCEPTIONS OF BROTHER AND SISTER: PIAGET REPLICATION STUDY V*

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A. Purpose

This is the fifth in a series of systematic replications of experiments originally performed by the Swiss psychologist, Jean Piaget. As its starting point this fifth replication takes one of Piaget's (1929) experiments dealing with children's conceptions of brother and sister. These conceptions were of particular importance to Piaget because they so clearly revealed the kinds of difficulties children at different ages had in handling the logic of relations. After studying these age-related difficulties by means of a semi-clinical interrogatory (Piaget 1929, Chapter 2), Piaget undertook to verify his results by means of standardized tests and statistical procedures (Piaget, 1929, Chapter 3). Examining over two hundred 5- to 12-year-old children, Piaget found that his tests not only discriminated between age groups but also revealed three stages in the development of brother and sister conceptions. One purpose of the present study was to compare the results Piaget obtained from testing Swiss youngsters with those obtained from testing American children. The present study differs from the replication of Danziger (1957) in its use of a larger sample and in its close adherence to Piaget's tests.

B. Method

1. *Subjects*

Two hundred and ten Jewish children[2] attending a day camp[3] in Westwood, Massachusetts, were tested. The sample consisted of thirty subjects

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* Received in the Editorial Office on March 21, 1960.

[1] This study was carried out while the writer was consultant to the Cambridge Child Guidance Center. To Dr. Robert Reid, Director of the Clinic, and to Dr. Charles Hersch, Chief Psychologist, the writer is greatly indebted for support and encouragement.

[2] These subjects were also used in two previous studies (4, 5).

[3] The study was made possible through the courtesy of the Jewish Centers Association of Greater Boston. Mr. Louis Lowy, Camp Coordinator, and Mr. Leonard I. Nemeth, Summer Day Camp Director, gave generously of their time and administrative skills. To these men and to the many counselors, without whose help the study could not have been made, the writer owes a hearty thanks.

at each year level from 5 to 11 who were randomly selected from a total camp population of over eight hundred children. The children came from many different sections of Boston, from many socio-economic levels and from public, private and parochial schools. It was assumed that the heterogeneity of the sample in these respects compensated for the ethnic homogeneity of the group and that it was a fairly representative sample of Boston area school children. The mean age and standard deviation for each group is given in Table 1.

TABLE 1
MEAN AGE AND STANDARD DEVIATION FOR SEVEN AGE GROUPS USED IN REPLICATION STUDY
N = 30 at Each Age Level

Age Group	Mean Age	SD (in mos.)
5	5-7	1.33
6	6-4	2.77
7	7-6	2.65
8	8-5	2.66
9	9-4	2.96
10	10-6	2.87
11	11-4	3.44

2. *Tests and Procedure*

Piaget used six tests in his experiment and the same six tests, presented below, were used in the present study.

1. How many brothers have you? And how many sisters? (Let us suppose that the child has a brother A and a sister B.) And how many brothers has A? And how many sisters? And how many brothers has B? And how many sisters?
2. How many brothers are there in your family? How many sisters? How many brothers and sisters all together?
3. There are three brothers in a family: Harold, Alfred and Raymond. How many brothers has Harold? And Alfred? And Raymond?
4. Are you a brother (or sister)? What is a brother (or a sister depending on the sex of the child).
5. Ernest has three brothers; Paul, Henry and Charles. How many brothers has Paul? And Henry? And Charles?
6. How many brothers are there in this family?

The tests were always given in the above order.

3. *Scoring*

Piaget scored a test as passed only if all the questions included within it were answered correctly. Spontaneous corrections and corrections made after errors of inattention were also scored as passed. The same method of scoring was used in the present study.

C. RESULTS

1. *Tests of Brother and Sister*

Piaget found that his tests discriminated between age groups and he reported the age levels at which 75 per cent of his subjects passed each test. In Table 2 the age levels at which the tests were passed by Piaget's subjects are compared with the age levels at which they were passed by subjects in the replication study. Table 2 shows that with the exception of Test 1, discussed below, there was no more than a year discrepancy between the results reported by Piaget and those obtained in the present study. Considering the cultural differences between original and replication subjects, the fact that the two studies were separated thirty years in time and the random errors of sampling, the agreement shown in Table 2 is quite remarkable. The agreement shown in Table 2, as well as the results shown in Table 3, speaks well for Piaget's contention that the tests measure developmental changes in conceptual thinking.

The only large discrepancy between original and replication subjects occurred on Test 1. This was passed by Piaget's subjects at age 10 and by the replication subjects at age seven. In his discussion of Test 1, (How many brothers does your brother have?), Piaget noted that it was frequently passed by younger children. He suggested that in part the difficulty of the test was dependent upon an incidental factor, the number of children in the child's family. If the child came from a fairly large family of boys and girls, Test 1 posed some rather difficult mathematical problems aside from problems of conceptualization.

One of the notable things about the Jewish children of the present study was the smallness of their families. Only ten children out of 210 had families with more than three children and more than half had two or less children in their family. On the other hand it seems likely that Piaget's subjects came from much larger families. It is therefore possible was due the difference in the size of the family units from which the two groups came. Since conceptualization and not mathematical ability was under study it seemed reasonable to place the test at the age where it was passed when its mathematical difficulty was at a minimum. In the following discussion, therefore, Test 1 will be considered as passed at the age of seven, the age at which it was passed by the replication group.

TABLE 2

COMPARISON OF ORIGINAL AND REPLICATION STUDIES FOR AGE LEVEL PLACEMENT OF TESTS
Criterion for Placement = 75 Per Cent Passing

		Tests					
N	Study	1	2	3	4	5	6
200[a]	Original	10[c]	6	8	9	10	10
210[b]	Replication	7[d]	6	8	9	11	11

[a] Number at each age level not reported.
[b] Thirty subjects at each age level except for Test 1.
[c] Based on 180 subjects having brothers and sisters.
[d] Based on 196 subjects having brothers and sisters.

TABLE 3

PER CENT OF SUBJECTS PASSING "BROTHER" AND "SISTER" TESTS FOR SEVEN AGE GROUPS
N = 30 at Each Age Level[a]

Age	Tests					
Group	1	2	3	4	5	6
5	31	50	20	7	0	0
6	57	77[b]	23	23	10	10
7	83[b]	93	74	53	43	33
8	81	90	93[b]	74	43	40
9	87	100	93	77[b]	67	59
10	92	100	97	93	74	70
11	93	96	100	97	77[b]	77[b]

[a] Test 1 was administered only to children who had brothers and sisters: For Test 1, N was: 29 at age five; 30 at age six; 29 at age seven; 27 at age eight; 30 at age nine; 24 at age ten and 27 at age eleven.
[b] Age level at which test was placed.

Piaget, in his interpretation on his results took up the tests one by one and attributed success and failure to; incidental factors, logical difficulty of the tests, the stage of conceptual development, and to the "egocentric illusion" whereby the child took his own viewpoint as absolute and therefore failed to discover how many brothers his own, or fictitious, brothers had.

It seemed to the present writer, however, that the tests could be more economically interpreted if they were regarded as measuring two different but related conceptions. One was the class conception of "brother" measured by Test 4. The other was the relational conception of "having-a-brother" measured by Tests 1, 2, 3, 5 and 6. Each of these conceptions developed through three age related stages, but they differed in the year levels at which the stages appeared and in the character of the stages themselves. Although such an interpretation does not necessarily contradict Piaget's, it does differ markedly from his formulation. Accordingly the present writer is wholly responsible for the interpretation of the results given below.

2. *Development of the Class Conception of Brother*[4]

Stage 1. At the first stage, usually ages 5-6, the child had a general conception of "brother" and immediately identified himself as a brother (if he was). When forced to break down this conception and to say what a brother was, the first stage child revealed a conception that was both under and over differentiated. His conception was over-differentiated in the sense that when he thought of the male aspect of "brother" he said that a brother was a boy and that all boys were brothers. On the other hand his conception was under-differentiated in the sense that when he thought of the kinship aspect of "brother" he said all boys were not brothers because some were fathers, cousins, uncles. Because of this simultaneous over and under differentiation, the first stage child's conception was non-differentiated.

Stage 2. The child at the second stage, usually ages 7-8, had a concretely differentiated conception of brother. It was differentiated in the sense that the child knew that not all boys were brothers and that fathers, uncles, cousins could also be brothers. Nonetheless the second stage child's conception was only concretely differentiated in the sense that what distinguished brothers from other boys was a perceptual property. A brother was "the littlest boy" or "someone who lives with you." It was because brothers were distinguished from other boys by immediately perceived properties that the conception at the second stage was only concretely differentiated.

Stage 3. Finally at the third stage, usually age nine and older, the child had a true or abstractly differentiated conception of "brother." The child at this stage said that a brother was a "relative" or "had the same mother" or "there has to be two in the family." The third stage child distinguished brothers from other boys by means of a non-perceptual quality, namely, belonging to a family or being born from the same mother. It was the third stage child's use of a non-perceptual property to define "brother" which made his conception abstract.

3. *Development of the Relation Conception of "Having-a-brother"*

Stage 1. At the first stage, usually ages 5-7, the child had a general impression of having brothers and knew the number of his own siblings. But when forced to break down this impression and to say how many brothers each of his own or fictitious brothers had, the child revealed a conception of having-a-brother which was different than the adults.

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[4] For economy of presentation the argument will be made with respect to the brother conception only. It should be understood that the interpretation holds equally for the conception of sister and having-a-sister.

Len, 6-2, How many brothers do you have? "One, David." And how many brothers does David have? "He don't have no brothers." Really? "No." Are you David's brother? "Yes." So how many brothers does David have? "None."

Although the child was sure that he had brothers and that he was a brother, he denied his brother had brothers. The reason for this denial was that in order to grasp the notion that his brothers had brothers the child had to coordinate two relations at the same time. He had to think simultaneously of having a brother (from his brother's viewpoint) and of being a brother (from his own viewpoint). It was the child's inability to coordinate the two relations—a difficulty equally apparent in the young child's quantitative (2) and class thinking (3)—that caused the child to assert that this brother had no brothers. When he thought of having a brother he "forgot" that he was a brother and when he thought of being a brother he "forgot" he had brothers. Because the child at this stage behaved as if having-a-brother did not imply being-a-brother his conception was asymmetrical.

Stage 2. The second stage child, usually ages 7-9, had an intuitively symmetrical conception of having-a-brother. At this stage the child could discover (with prompting such as "Are you his brother?") how many brothers his brother had (Test 1 passed at age seven) and how many brothers each of three fictitious brothers had (Test 3 passed at age eight). The child's conception was intuitive, however, in the sense that he could only coordinate and discover the symmetry between having and being a brother under certain conditions. The conditions were that the child had to be given both relations, either by prompting (Test 1) or in the test question itself (on Test 3 the child was told that the three boys were brothers and that they had brothers). When both relations were not given, as in Tests 5 and 6, the second stage child failed to construct one relation from the other. Accordingly, on Test 5 the child at the second stage said that each of Peter's three brothers had two brothers and that there were only three brothers in the family. The second stage child's conception was only intuitively symmetrical for although he could *discover* the symmetry between having and being a brother when both relations were given, he could not *construct* one relation from a knowledge of the other.

Stage 3. For the child at the third stage, usually ages 10-11, the conception of having a brother was truly symmetrical or abstract. When the third stage child was told that Peter had three brothers he immediately inferred that Peter was a brother. He said that each of Peter's brothers had three brothers and that there were four brothers in the family (Tests 5 and 6 passed at age 10). At this stage the child was not only able to coordinate the relations of having and being a brother, he was also able to construct one relation from a knowledge of the other. The spontaneous construction of one relation from another reflected a new independence of the child's thought from the domination of perceptual givens. It was because the child was able to spontaneously contruct the compliment to a symmetrical relation that his conception was true or abstractly symmetrical.

The above interpretation of the development of the relational conception of having-a-brother was made with regard to only one property of relations, namely symmetry. Relations, however, have other properties such as reflexivity and transivity that were not tested by Piaget's questions. To fully account for the development of relational conceptions it will be necessary to study the development of all their properties. Even though the stages in the development of having-a-brother conception are based on the study of a single relational property they do suggest that class and relational conceptions—even when similar in name—can undergo quite dissimilar developments.

D. Summary

Two hundred and ten, 5 to 11-year-old children were tested in a systematic replication of Piaget's study of children's conceptions of brother and sister. There was generally good agreement between original and replication studies regarding the ages at which tests were passed and regarding the kinds of responses obtained.

In the present study, however, the results were given an interpretation different from the one offered by Piaget. According to the present paper Piaget's tests measured not one development, but two; that of the class conception of "brother" and that of the relational conception of "having-a-brother." The course of the two developments was traced in relation to success and failure on Piaget's tests. While both class and relation conceptions developed in three stages, these were different in character and appeared at different ages. It was concluded that the class and relational conceptions associated with the same term can undergo quite different developments.

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The Journal of Genetic Psychology, 1962, **100**, 137-141.

PERSONALITY MEASUREMENT IN CHILDREN, UTILIZING EMOTIONALLY-LOADED WORDS*

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A. Problem

The development of measures of personality in children has taken two essentially divergent courses. One phalanx of research has been directed toward the development of self-report questionnaires such as Cattell's (1957) High School Personality Quiz and Children's Personality Quiz, or the California Test of Personality (1953). The items for this genus of test are selected from clinical knowledge of symptoms. These are worded to fit into a child's experiential framework and then tested for validity against either existing instruments or criteria groups selected from a clinical population. The great fakeability of this kind of instrument is well known and is only partially compensated for by its scoreability.

The other major division is made up of the projective tests. The Rorschach and McClelland Need-Achievement tests are representative of this group. Here the problem of fakeability is replaced by scoring difficulties.

The problem for this research was to explore the area lying between these two classes of instruments by constructing a sample test utilizing a different principle which might combine some of the advantages of the predecessor tests. The "emotionally-loaded" word, the insult or compliment, seems to elicit considerable emotional response from the child and was, therefore, selected for this investigation as a device with great potential for reflecting personality differences in children.

B. Procedures

Pretests of fifty-two insults and forty-two compliments were given to 154 fourth, fifth and sixth grade children to establish some scale of acceptability and unacceptability of the terms. Analysis of these results showed distinct tendencies for the words to differ for operationally defined groups

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* Received in the Editorial Office on March 24, 1960.

[1] This study was based on a dissertation submitted as a partial fulfillment of requirements for a Ph.D. at the University of Houston. Gratitude is sincerely extended to S. Bliss Red whose help and supervision was creative, realistic and thoughtfully rendered.

C. Results

The scales were intercorrelated to establish their identity as separate scales after the removal of the variance related to tendency to choose a large number of items on the picture description test. These bore meaningful relationships to each other which added construct validity to the scales (see Table 1).

The reliability and validity for each of the scales is found in Table 2. Ratio scales were computed for each pair of related scales to make the greatest use of the information available for a given dimension. The absence of a standard deviation of these scales in the table is a result of the extreme skewness of the distribution of a ratio scale.

TABLE 2
Cross Validation Data
N = 300

Scale	Mean	SD	Reliability	Validity
Masculinity	39.2	9.46	.857	.63
Femininity	29.5	6.31	.735	.73
Masc./Femn.	1.3	—	.92	.79
Extrapunitive	21.8	4.84	.708	.03
Intrapunitive	17.6	3.48	.59	.13
Extr./Intr.	1.24	—	.485	.12
High aggression	21.12	4.33	.686	.21
Low aggression	22.0	4.99	.694	.21
High agr./Low agr.	.96	—	.72	.30
Maturity	17.66	4.83	.60	.50
Immaturity	21.48	5.35	.68	.26
Matr./Immt.	.82	—	.72	.48
Peer adjustment	26.66	4.15	.635	.34
Peer maladjustment	19.63	4.78	.738	.40
PA/PM	1.36	—	.76	.39

The conformity-nonconformity scales were tested separately as screening scales for their ability to discriminate those children who might be expected to show signs of adjustment difficulties. Comparisons with teacher anecdotes indicated that the nonconformity scale had special value for this end. The upper 15 per cent on the nonconformity scale yielded subjects who were significantly located on the unfavorable ends of all the other scales. This also substantiated its value as a screening scale.

D. Discussion

The failure of the intrapunitive and extrapunitive scales to reach any degree of validity highlighted one of the weaknesses of the design of the study. The criteria groups for selection of items and cross validation of these scales depended upon teachers' ratings, a notoriously unreliable procedure. The rating scales were short and the division of the results into four groups yielded very tenuous discriminations. The purpose of the study was not defeated by the failure of these two scales, however. The degree of validity and reliability which was found indicated that these dimensions could be measured by this means if the criteria groups were more rigorously defined.

This test should be further explored in relation to existing personality instruments. A factorization of its items might also give a clearer picture of the underlying mechanisms which contribute to its success as a measuring instrument.

E. Summary

In the effort to explore new methods of measuring personality in children, the device of emotionally loaded words was utilized. A test composed of twelve scales was developed which was then tested against a cross-validating population of 300 fourth, fifth and sixth grade subjects.

The results indicated that all of the twelve scales had a reliability over .60. The validities for the four aggression scales were below an acceptable level but this was attributed to the unreliability of teachers' ratings used in both validation samples. The other eight scales, however, showed remarkably good validities for this area of investigation. The intercorrelation between scales yielded further indications of the construct validity of the scales. The study thus confirmed the hypothesis that the emotionally-loaded word is a successful vehicle for personality measurement, with implications for even greater success if applied in more rigorously developed scales.

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The Journal of Genetic Psychology, 1962, **100**, 143-149.

CONSENSUS OF CHOICE AMONG CHILDREN: A TEST OF PIAGET'S THEORY OF COGNITIVE DEVELOPMENT*

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A. PURPOSE

Piaget's theory of developmental stages in perception and cognition is still a controversial area for research. A reviewer feels that such stages "are no more successive than" Freud's libidinal stages and cites Estes' negative findings (3) to support her contention (15, p. 135). Estes' findings, however, cannot be considered negative to a view of cognitive development in stages, because of the restricted age limit of her sample (four to six years of age). Another reviewer, on the other hand, feels that "Piaget's ideas continue to be the major inspiration of research in this area" (12, p. 465).

With notable exceptions (2, 3, 5, 8, 9, 10) most of the research supporting Piaget's views has been based on the Rorschach test. According to these studies the child before seven years of age perceives reality according to globally concrete, prelogically synchretic terms. He is not yet capable of understanding complex relations (4). Age seven represents one of the most critical times for a discontinuous shift, whereby the child starts to view and to react to reality analytically. From a global, concrete approach there is an abrupt change into a more fragmentary detailed perception of reality (1, 6, 11). At this stage thinking starts to precede action. Complex cognitive relationships to external situations start to develop, and a first step is made toward a greater degree of sociocentric objectivity. There is no longer an arbitrary or random selection of objects, but there is an adaptation to the demands of external objects. In terms that are relevant to the present study, the child changes his choice of objects based on autistic schemes to a choice based on social norms and on external criteria of appropriateness (5, 7, 13, 14).

If such views are valid, age seven could be considered a crucial area to explore in terms of sudden shifts in responses to stimuli other than Rorschach ink-blots. If the child is faced by a number of choices to make, his choice will be random or nearly random before age seven. At this stage he will start to become more socialized and to choose according to more sociocentric

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* Received in the Editorial Office on March 28, 1960.

principles. At this stage one would expect to find a most dramatic shift in the pattern of choices. The present study is a test of this prediction.

B. Method

1. *Stimulus Materials*

A multiple-choice, picture-story projective technique consisting of seven sets with one master picture and four or five pictures for each set constituted the experimental materials of this study. The nature of these materials has been presented and described at length in published (9, 10) and unpublished research (8). Briefly, the content of these sets include various pictures of complex situations with children and adults playing, painting, and dreaming and pictures with animal content like deer and lambs.

2. *Procedure With Each Child*

Most of the individual administration of these pictures took place in school health rooms to avoid possible noises and disturbances. The order of presentation for each set of pictures was completely random from child to child to eliminate serial effects. Each set was presented according to standard instructions. The master picture was first presented with the accompanying story. At the end of this brief introduction the master picture was withdrawn and the four or five possible choices were presented to each child, as in this example: Master picture presented with this story, "This is a fairy talking to a child. The fairy says to the child, 'Make a wish, you can have anything you like.' (Master picture withdrawn.) Which one of these pictures here did the child choose?" The other pictures of the set were spread in front of the child and his first and subsequent choices and descriptions of the pictures were recorded.

3. *Selection of Experimental Sample*

The children of this investigation were selected from a list of the total number of children in kindergarten and first five grades in a midwestern city. This record contained the following information: name of the school, number of children enrolled in each grade,, and the number of sections for each grade in each schol. From these data the number of children enrolled from kindergarten through grade 5 was summed cumulatively. On the basis of 170 random numbers between 0 and 17,000 it was possible to identify each potential subject in each class and section according to alphabetical order and the class roll, thus eliminating biases in socioeconomic background and selection by the teacher. The random sample was stratified for each

TABLE 1
FREQUENCIES OF CHOICE FOR PICTURES

Sets	pictures	Kindgt. N = 36	Grades 1 N = 28	2 N = 28	3 N = 30	4 N = 26	5 N = 22	Tots. N = 170	χ^2 df = 5	p
1	Pref.	10	12	16	14	13	15	80	10.81	$.05<p<.10$
	Non-Pref.	26	16	12	16	13	7	90		
2	Pref.	14	13	16	20	16	13	92	6.82	N.S.
	Non-Pref.	22	15	17	10	10	9	78		
3	Pref.	12	15	17	20	16	14	94	9.80	$.05<p<.10$
	Non-Pref.	24	13	11	10	10	8	76		
4	Pref.	16	22	23	23	22	18	124	19.24	$p<.001$
	Non-Pref.	20	6	5	7	4	4	46		
5	Pref.	18	13	13	14	9	6	73	4.11	N.S.
	Non-Pref.	18	15	15	16	17	17	97		
6	Pref.	18	18	27	27	20	19	127	21.91	$p<.001$
	Non-Pref.	18	10	1	7	6	3	43		

grade to represent 1 per cent of the school population in each grade. The *Ss* came from 42 different elementary schools. Boys and girls were selected alternatively so that the sample consisted of half boys and half girls. When the selected child was not available, the next child of the same sex in the class roll was selected.

C. RESULTS

The present analysis is limited to the picture that was chosen first in each set. The frequencies of choice were combined for boys and girls after an χ^2-test failed to show any statistically significant sex differences. One set of pictures was eliminated from these results because of its inadequacy to yield comparable data, owing to the presence of different pictures for boys and girls. After it was evident that each set contained one picture that was singled more often than all the others together, the results were analyzed and reported in terms of preferred versus nonpreferred pictures (Table 1) in the six remaining sets. The χ^2-test indicates that the progressive preference for the most chosen picture in each set as children grow older is statistically significant for Sets 4 and 6; statistically favorable but not very pronounced for Sets 1 and 3; apparent but statistically nonsignificant in Set 2; reversed and nonsignificant in Set 5.

The frequencies of choice were then reduced to percentages for each set and averaged for all six sets in terms of mean percentage of choice for preferred and nonpreferred pictures (Figure 1). There exists an increase in percentage of choice with age for preferred pictures and a parallel, reciprocal decrease in percentages of choice with age for all other nonpreferred pictures. These preferences were random in kindergarten, almost random in the first grade, but from second grade on children tended to choose most preferred pictures in a rather consistent, although by no means absolute, fashion. No progressive improvement in choices is present after the second grade.

D. DISCUSSION

These results are entirely consistent with Piaget's view and from results concerning the development of a second analytic stage at age seven (7, 13, 14) from Rorschach research (1, 4, 11). The differences in statistical significance between sets should be viewed as being a function of the nature of the content of each set, its clarity, meaningfulness to the child (8, 9). The over-all percentages of choice best reflect the expected shift.

At age seven, children started to agree on one picture as being more appropriate than all others in each set. Kindergarten children chose the pictures in a random manner. Their arbitrary choices perhaps bespeak the lack of understanding of the problem presented to them. Furthermore, their arbitrary choice may be determined by a greater degree of impulsivity than older children, whose more consistent choices may have been determined by introduction of greater delay and inhibition before choosing. The shift at seven years of age should be also viewed as being subsequent to the first year in school when the child enters into contact with other children and with the external, more often inhibiting demands of authority figures, i.e., teachers. The first year of school then produces the increase of delay that is necessary to the development of thinking (7, 13, 14). The shift in the second grade perhaps best reflects what the child has learned during the first grade. Psychoanalytic writers would consider this stage as being related to the postoedipal period. By then the child's primary process is completely dominated by the progressive development of secondary process.

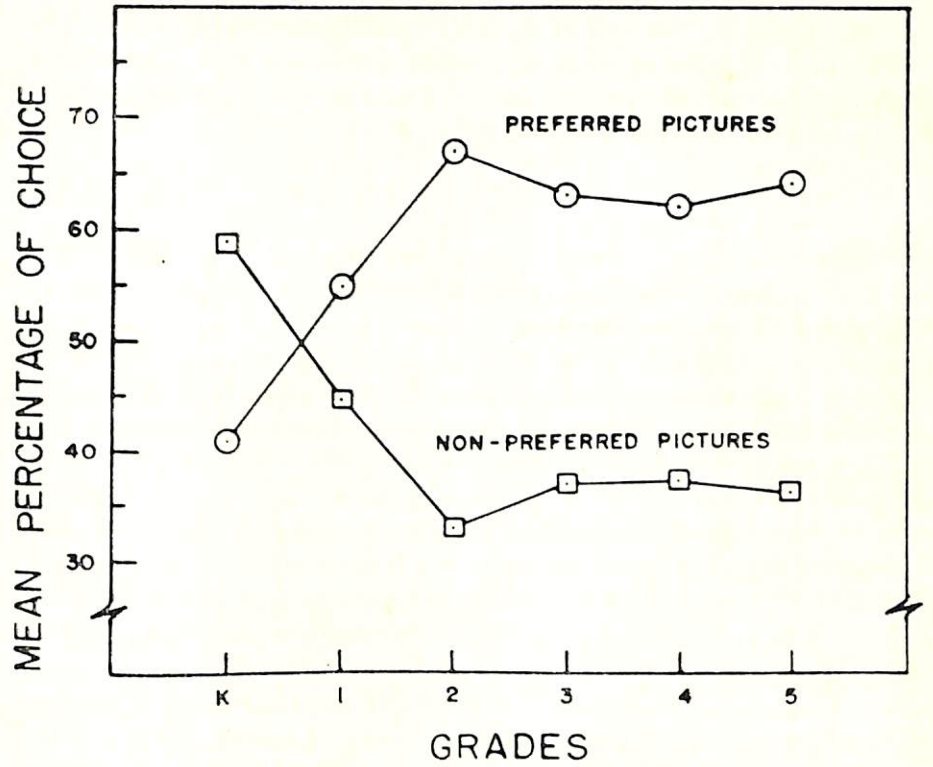

FIGURE 1

PERCENTAGES OF CHOICE FOR PREFERRED AND NON-PREFERRED PICTURES AS A FUNCTION OF AGE

Other qualitative changes occurred in the children's verbalizations besides the shift in the second grade (8). After this grade, children gave a greater number of significant details, in line with similar findings with the Rorschach (1, 6, 11). In contrast to children in kindergarten and first grade who gave concretely irrelevant causal reasons, children after second grade gave abstractly relevant causal reasons. Younger children also showed a greater number of misperceptions and of confused sexual identifications. Piaget's three stages of synchretic, analytic, and synthetic cognitive development could be best illustrated by the children's description of a picture of a boy lifting weights as: in kindergarten and first grade, "giant"; in second and third grades, "grown up" or "man"; in fourth grade, "wrestler"; and in fifth grade, "weightlifter." It was toward the last two grades that the children were able to integrate the pictures in a synthetic whole, very much like Piaget explains (7, 13, 14).

In terms of Piaget's theory it is interesting to speculate additionally that at age nine (fourth grade), children showed a greater use of "uncertainty expressions" in describing the pictures (10). This trend may be viewed, therefore, as a beginning attempt at a synthetic integration of wholes and details (7, 11, 13, 14). During the beginning of the third stage the child acquires a more relativistic view of reality and starts to qualify his view through his uncertainty. On the basis of the present results and interpretations, Piaget's views are not as farfetched as one reviewer would like us to believe (15).

E. SUMMARY

Piaget's theory of cognitive development in stages predicts a sudden change from a global to an analytic approach to reality at age seven. Because of the controversial nature of Piaget's views, this study proposed specifically to test this prediction. A multiple-choice picture story test was presented to 170 boys and girls selected at random from kindergarten to fifth grade. The results based on the percentages of choice of one preferred picture in each set over all the other pictures in the same set show an increasing tendency to choose the more preferred picture after the second grade (age seven). The choices of children at kindergarten were random and arbitrary, while children in the first grade tended toward an increasing choice of the preferred picture in each set. No progressive increase after the second year was found. These results were interpreted as supporting Piaget's view of developmental stages in cognitive functioning in the child.

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The Journal of Genetic Psychology, 1962, **100**, 151-154.

THE EFFECT OF A NOVEL AND NOVEL-NOXIOUS STIMULUS UPON SOCIAL OPERANT BEHAVIOR IN THE RAT*

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A. PURPOSE

Recently the description of perceptual and non-consummatory reinforcement has received much attention in the literature. Investigators seem to be fascinated by behavior, whose underlying mechanism is "non-homeostatic." Many studies have been performed which show these mechanisms at work, such as the work by Girdner (1953), Harlow and McClearn (1954), Marx, Henderson, and Roberts (1955), and Myers and Miller (1954). Yet, relatively little emphasis has been placed upon responses which are reinforced by seeing or touching another animal. Angermeier (1959) described the socially reinforced bar-pressing behavior of rats. In this study, it was concluded, that the involvement of tactile receptors played an important part in the acquisition of the behavior. Angermeier and James (1960) reported similar findings for social operant behavior in dogs. White (1959) summarized a great deal of information about motivation, and called behavior not reducing a need, "competence," and its motivational aspects "effectance."

The study presented here treated the question whether a novel social stimulus could have an enhancing or depressing effect upon socially reinforced bar-pressing behavior, and how this behavior is influenced by a combined novel-noxious stimulus.

B. METHOD

1. *Subjects*

Six male adult albino rats, approximately 250 days of age, and previously conditioned to press a bar for visual contact with another male or female rat, were used in this study. One 3-day-old baby chick of the Vontrese Cross Breed served as novel social stimulus.

2. *Apparatus*

The apparatus has been described in principle elsewhere (Angermeier and James, 1960). It permitted the application of perceptual types of reinforce-

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* Received in the Editorial Office March 28, 1960.

ments for time intervals ranging from 0 to 60 seconds. In this investigation, the time interval was fixed at 10 seconds following each bar-press.

3. *Procedure*

The six animals were conditioned in twenty 1-hour sessions to press the bar for visual contact reinforcement with a male or female rat. Two 1-hour extinction sessions followed the acquisition training. Thirty days later these animals were given three daily 1-hour retraining sessions on the same task. On the following day one 1-hour session was given with the social reinforcement consisting of a three-day-old baby chick. The next day this procedure was repeated; but in addition to the social stimulus animal, a 100-watt light bulb was placed 30 inches behind the opening in the work panel, so that when the animal pressed the bar, its light fell with an angle of 45 degrees upon this opening. The following and last day of the experiment, the chick alone acted again as social reinforcement. All animals were on continuous reinforcement, which was available after each bar-press for a period of 10 seconds.

C. RESULTS

The results of this study can be seen in Tables 1 and 2. Table 1 shows the results of an analysis of variance performed with the data. The difference between the four kinds of treatment was statistically significant at the .01 level, with F being 7.74 for three and 15 dfs. The difference between the *S*s' response frequency was also significant at the .01 level, the

F-ratio in this case being 4.94 for five and 15 dfs. In order to determine the simple effects, a critical difference (*d*) between the column means was computed, using Lindquist's method. Here, the response frequency between visual contact reinforcement with a rat and visual contact reinforcement with a chick was statistically significant at the .05 level. Another significant difference (at the .01 level) was found between the sessions using visual contact reinforcement of a chick and the combined chick and 100-watt light bulb stimulus. A significant *d* was finally found between treatments 2 and 4, both consisting of visual contact reinforcement with a chick; however, these treatments being separated by the session during which the novel-noxious stimulus was applied.

TABLE 1
ANALYSIS OF VARIANCE SUMMARY OF ACQUISITION FREQUENCIES

Source	SS	dfs	MS	F
Treatments (a)	2034.16	3	678.05	7.74**
Subjects (b)	2162.75	5	432.55	4.94**
Interaction (axb)	1314.09	15	87.61	
Total	5511.00	23		

** Statistically significant at the .01 level.

TABLE 2
CRITICAL DIFFERENCES IN ACQUISITION FREQUENCIES

			A2	A3	A4
Mean (A1) see rat	16.33				
Mean (A2) see chick	31.33	A1	15.00*	10.68	1.50
Mean (A3) chick-bulb	5.65	A2		25.68**	16.50**
Mean (A4) see chick	14.83	A3			9.18

* Significant statistically at the .05 level.
** Significant statistically at the .01 level.

D. DISCUSSION

This study seemed to indicate that a certain type of social stimulus will raise the behavioral frequency of an animal in an operant situation. The investigation also showed that a combined novel-noxious stimulus will depress behavior significantly, but not totally eliminate it. This depressing effect persisted during the following trial, keeping behavioral frequency from reaching its normal level of stability. This effect seemed to hold true, no matter how high or low the animal's rate of responding was. Generally, this investigation seemed to suggest the necessity of a more clearly defined quantitative assessment of different social stimuli along with the qualitative aspects of such stimuli, as for example, hue, size, sound, and patterns of movement.

E. SUMMARY

Six adult albino rats were trained to press a bar for visual contact reinforcement with another male rat, a baby chick, the combined effect of a baby chick and a 100-watt light bulb, and a chick again. The results suggested that there was a significant increase in behavior when a novel social stimulus —such as the baby chick—was introduced. The combination chick and light bulb significantly depressed the behavior, a phenomenon which persisted in a milder form during the following day, when the novel stimulus was again presented alone.

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The Journal of Genetic Psychology, 1962, **100**, 155-165.

RELATIONSHIP BETWEEN MATERNAL BEHAVIOR AND ATTITUDES TOWARD CHILDREN*

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A. THE PROBLEM

In spite of the interest in the assessment of parental attitudes concerning the guidance of children as reflected by the publication of numerous researches (e.g., 2, 3, 4, 6, 8, 11, 12), it is not clearly understood in what specific ways the attitudes as measured in these investigations are related to the behavior of parents in interaction with their children. Although it is commonly assumed in these studies that such measurements of parental attitudes yield important insights into existing parent-child relationship the validity of such a concept, however, has not been established by empirical investigations. No studies directly concerned with the relation between parental attitudes and behavior of parents in interaction with their children have been reported in the literature. Such a study may provide data on more stable characteristics of parents which conceivably effect the behavior of children, and may assist in ordering the complexity of problems involved in linking attitudes to actual behavior with children.

This study was designed to test the hypotheses that: (*a*) maternal attitudes toward children are significantly related to selected behavior of mothers, observed in interaction with their children; and (*b*) maternal behavior is independent of the sex of the child with whom the mother interacts.

B. EXPERIMENTAL DESIGN

1. *The Sample*

The sample consisted of 40 mothers who had children enrolled in the nursery school at Texas Woman's University. All of the mothers were classified as middle-class according to the McGuire-White (1955) Index of Social Status (5) (Short Form). They were full-time homemakers, white, American born, between the ages of 20-35, had two or more children, and were from intact families living in Denton, Texas. Twenty of the children were male and 20 female ranging in age from 2-9 to 5-1.

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* Received in the Editorial Office April 1, 1960.

2. *Procedure*

a. Laboratory observations of mother-child interaction. Although more interaction occurs between mother and child in the home than in the laboratory, observations of mothers with their children were made in the laboratory setting in order to provide a control of the distracting stimuli present in the home. It was also believed that it would be difficult for the observer to remain unobtrusive in the home and that his presence would influence the child's behavior to an even greater extent than would an unfamiliar setting (laboratory) with his mother present.

The observations were conducted in the Child Development Laboratory of the College of Household Arts and Sciences where there were facilities for observing each mother together with her child through a one-way vision mirror. The laboratory contains: (*a*) various types of toys; (*b*) easel; (*c*) books; and (*d*) blocks.

b. Definition of observational categories. Each mother-child pair was brought to the laboratory for one 30-minute period for the child to play while his mother stayed in the room with him. During these visits the mother's interaction with her child was observed and recorded according to categories similar to those developed by Merrill (7), Bishop (1), and Schalock (10). The categories were:

(–) *Being Un-cooperative*—e.g., Mother ignores the child's stimulation. Ex: Mother continues to read magazine when child addresses her.

(c) *Contacting*—e.g., Mother is in contact with the child either verbally or physically. "Physically" means sitting or being near the child as he plays, even though she says nothing. "Verbally" means purely social conversation with the child. Ex: "This is a nice doll-house. We'll see if daddy can build one for you like it."

(n) *Criticizing*—e.g., Mother criticizes, blames, or punishes the child. Ex: "Now pay attention to what you are doing—you're pouring that water all over the table."

(d) *Directing*—e.g., Mother specifically states the course of action which she wants the child to follow. Ex: "Put the doll over there on the table." "I want you to close the door now, Johnny, not later."

(k) *Giving Permission*—e.g., Mother consents to child's proposed activity. Ex: "Yes, you may use the towel."

(m) *Giving Praise or Affection*—e.g., Mother praises or gives encouragement to the child. This category also includes expressions of affection, such as petting or hugging the child. Ex: "That's a very fine boat you've made."

(h) *Helping*—e.g., Mother gives physical help to the child. Ex: Mother pounds a nail for the child or replaces the mast and the sail belonging to the sailboat.

(i) *Interfering*—e.g., Mother interferes with an activity on the child's part with the intent of stopping it completely. Ex: "Hey there, my boy—no more of that splashing." "No, Johnny, you are not to drink the water from those cups."

(si) *Interfering by Structurizing*—e.g., Mother indicates the undesirability of a certain action and/or the consequences of the act if carried out. Ex: "You know other boys and girls will want to play with those toys and if you mash them together like that they will be spoiled."

(+) *Lending Cooperation*—e.g., Mother responds to child's comments, suggestions, or requests with apparent interest and willingness. Ex: "I would love to play house with you."

(a) *Observing Attentively*—e.g., Mother noticeably directs her attention to the child and/or child's activity by silently watching. Ex: Mother watches child as the child plays with the stove.

(p) *Playing Interactively*—e.g., Mother is playing with child within the framework of the child's own conception of play; she plays as though she were another child: Ex: "I'll be the boat repair man and I'll fix the boat."

(z) *Reassuring*—e.g., Comfort or encouragement is offered by the mother. Ex: "Don't feel too bad. Most children find it difficult to work that puzzle the first time."

(o) *Remaining Out of Contact*—e.g., Mother is sitting apart from the child, and is either reading magazines or looking away from the child. Ex: Looking out of the window.

(r) *Restricting*—e.g., Mother modifies child's behavior by reducing intensity, speed, manner of executing, etc., but does not stop activity completely. Ex: "Don't splash the water so high."

(s) *Structurizing*—e.g., Mother facilitates activity on the part of the child by methods which stimulate independent thinking and relegates the responsibility of decision to the child. Ex: "Do you see something in this room out of which you could make a boat?"

(t) *Teaching*—e.g., Mother gives information to the child for the purpose of increasing his knowledge. Ex: "This is a duck and that is a swan—swans have longer, thinner necks than do ducks."

c. Reliability. Before observations were made for the purpose of data collection, it was necessary to achieve relatively high observer agreement with respect to the identification of the behavior under investigation, and their accurate placement within a given time interval.

Reliability was measured by calculating percentages of agreement between two observers recording maternal behavior simultaneously during thirty-minute periods. Middle-class mothers together with one of their children, who were not included in the study served as subjects for establishing reliability. The observers became familiar with the definition of behavior categories, code letters, and scoring system. Categories were memorized and agreement reached concerning types of behavior defined by each of the categories. Measures of agreement were obtained by comparing the observations of one observer with observations taken independently and simultaneously by another observer. These measurements of agreement may be obtained by (*a*) computing the percentages of agreement of the observers, or (*b*) correlating total scores obtained by two observers in successive periods of observation. The correlation method yields a spuriously high measure of reliability in that it measures only total agreement and not agreement on identical behavior categories within specific time intervals. For this reason the percentage method has been utilized in this study.

In utilizing a predetermined system of categories it is difficult to determine whether disagreement between simultaneous records is a function of placing the recorded observations in the appropriate time interval, or a function of difference in hearing and seeing in identifying the behavior. It is possible for two observers to see different interaction occurring at the same time, or to miss an event. This may be due to the position of the observers from which the interaction is viewed, or in recording the behavior (looking from the behavior to the stop watch, to the observational sheet). Also, disagreement may arise from differing interpretations of occurring interaction.

Factors such as the lack of satisfactory behavior definitions, misinterpretation of occurring behavior, and various recording methods of the observers are all factors which tend to create timing errors in the observation.

When timing errors are operating, the computation of observer agreement becomes difficult. It is impossible to determine errors or disagreements by inspection alone. If both observers have recorded the same behavior in adjacent time intervals, there is no assurance that the apparently disagreeing observations do not actually represent the same behavior. However, if both observers have the same entries in the same time interval, one cannot be certain that the agreement is not a spurious result of time differences, e.g., one can never be certain that agreeing observations do not actually represent different events. The only way by which the observation can be checked is by sound photography. Since the physical settings in which observational studies are ordinarily undertaken preclude the use of necessary equipment for sound photography and because the expense makes such a technique impractical, ratings of mother-child interaction were made according to predetermined categories following a training period during which two observers demonstrated their ability to observe and record reliably. When the observers achieved a competency in the recording of the behavior represented by agreement of .80 or higher between independent observations during at least five sessions, the collection of data for the study began.

It was recognized that while the child was unaware that he was being watched, the mother might feel keenly the presence of the observer and might modify her behavior in such a manner as to present a more favorable picture of the interaction between herself and child than actually exists in the home situation. Procedures for measuring the effect of the observers' presence on the mother's behavior are being studied by other investigators, but no conclusive evidence concerning this influence is currently available.

The mother was told to imagine the time spent in the laboratory as a half-hour in her own home, during which she is unoccupied by household duties and is free to be in the room where her child is playing. She was asked to act as she would if she were really in this situation. Questions were answered by stating that there was no particular way that she should act with the child and that she was free to do as she would do at home. Her behavior was rated and recorded under the appropriate category every five seconds. The observed behavior constituted the measure of the mother's behavior in interaction with her child.

d. Description of attitude scale. In order to obtain measures of maternal attitudes, mothers were given the Parental Attitude Research Instrument (PARI) developed by Schaefer and Bell (9). This measuring instrument was selected because it offers a variety of content, assesses a wide range of attitudes, and is one upon which information concerning reliability and validity, is available.

e. Administration of the attitude instrument. During the visit to the laboratory the PARI was administered to the mother by the investigator after the observation session while the child was absorbed in his play. The administration was by means of a structured interview in a room apart from the playroom.

The items utilized in the PARI were those appearing in 16 of the 23 subscales. It was felt, because the PARI measures attitudes toward children and family life, that only subscales pertaining to children were used in this study. The remaining seven subscales were concerned with attitudes toward family life.

C. RESULTS

1. *Reliability of Maternal Behavior Ratings*

Disagreement most commonly evidenced by the observers was due to the placement of observed behavior in separate time intervals. This error was difficult to correct and most troublesome in establishing a satisfactory level of reliability.

The category reliabilities between the two observers expressed in terms of per cent of their agreement concerning maternal behavior based on five 30-minute periods of observation, are presented in Table 1. The percentages of agreement ranged from 81 to 100 per cent.

TABLE 1
RELIABILITIES OF MATERNAL BEHAVIOR CATEGORIES BASED ON FIVE 30-MINUTE OBSERVATIONS

Category	Frequency	Percentage of agreement between observers
Being un-cooperative	2	86
Contacting	780	89
Criticizing	2	84
Directing	28	90
Giving permission	10	100
Giving praise or affection	12	81
Helping	4	100
Interfering	8	92
Interfering by structurizing	14	87
Lending cooperation	16	88
Observing attentively	706	97
Playing interactively	24	88
Reassuring	4	100
Remaining out of contact	142	90
Restricting	6	84
Structurizing	16	86
Teaching	26	82

2. *Observed Maternal Behavior*

Table 2 shows the frequency with which maternal behavior in the laboratory appeared in each category. The categories of *Contacting, Directing, Lending Cooperation, Observing Attentively, Playing Interactively, Remaining Out of Contact, Structurizing,* and *Teaching* constituted the major types of mothers' behavior toward their children, while under observation. Although some mothers exhibited such behaviors as *Being Un-cooperative, Criticizing, Giving Permission, Giving Praise or Affection, Helping, Interfering, Interfering by Structurizing, Reassuring,* and *Restricting,* these behaviors generally had a low frequency of appearance.

3. *Relationships Between Maternal Attitudes and Behavior*

The significant relationships which appeared between the subjects' attitudes, as measured by the PARI, and their observed behavior toward their children are presented in Table 3.

TABLE 2
FREQUENCY OF APPEARANCE IN THE LABORATORY OF CATEGORIZED MATERNAL BEHAVIORS

Behavior category	Number
Being un-cooperative	6
Contacting	6420
Criticizing	10
Directing	920
Giving permission	30
Giving praise or affection	42
Helping	84
Interfering	36
Interfering by structurizing	92
Lending cooperation	170
Observing attentively	4688
Playing interactively	202
Reassuring	41
Remaining out of contact	1285
Restricting	31
Structurizing	133
Teaching	210

TABLE 3
CORRELATION VALUES BETWEEN MATERNAL ATTITUDE SCORES AND OBSERVED BEHAVIOR RATINGS

	Behavior categories					
Attitude subscales	Contacting	Directing	Helping	Observing attentively	Remaining out of contact	Teaching
Approval of activity	.34*			.46**		
Avoidance of communication					.46**	
Breaking the will		.35*				
Comradeship and Sharing			.32*			.36*
Encouraging Verbalization	.34*		.36*			.37*
Equalitarianism	.32*		.36*			.34*

* Significant at .05
** Significant at .01

Of the 272 comparisons made by means of Spearman rank correlation coefficients computed between frequencies in the seventeen maternal behavior categories and the sixteen attitude scales, twelve evidenced significant relationships at the .05 level or beyond.

Although logical relationships are suggested by the significant values of the correlation coefficients between the six attitude subscales and six behavior categories the interpretation of these statistical relationships should be undertaken with caution. One might expect, by chance, to observe values which attained significance at the .05 level approximately five times out of 100 when no real relationship exists.

It is recognized, however, that the lack of apparent relationships, may in many instances be a function of the setting in which the observations were made. Also it is not unlikely that in the home setting the mother might have evidenced more *Un-cooperative, Criticizing, Interfering,* and *Restricting* behavior, for instances, than she did in the laboratory setting because of her desire to appear to be a "good mother" while being observed by the experimenter.

4. *Maternal Contacts with Sons and Daughters*

The frequencies of the various types of maternal contacts with sons and daughters are presented in Table 4.

TABLE 4

FREQUENCY OF MATERNAL CONTACTS WITH SONS AND DAUGHTERS

Behavior categories	Mother's interaction with sons	Mother's interaction with daughters
Being un-cooperative	4	2
Contacting	2962	3458*
Criticizing	7	3
Directing	419	501
Giving permission	17	13
Giving praise or affection	23	19
Helping	37	47
Interfering	21	15
Interfering by structurizing	39	53
Lending cooperation	81	89
Observing attentively	2989	1699*
Playing interactively	103	99
Reassuring	27	14
Remaining out of contact	602	683
Restricting	19	12
Structurizing	61	72
Teaching	93	117

* Median test value significant at the .05 level

Of the seventeen behavior categories, only two showed a significant relationship with the sex of the child at the .05 level when the median test was employed. The mothers of daughters evidenced more *Contacting* than did mothers of sons. However, mothers of sons showed more *Observing Attentively* behavior than did mothers with daughters.

D. DISCUSSION

The lack of statistically significant relationships observed between maternal attitudes toward children and most of the selected behavior of mothers in an unstructured laboratory setting suggests several hypotheses, e.g., the mothers' behavior evidenced in a laboratory setting may not have been representative of their behavior under home conditions. Since the mother knew an observer was present she may have evidenced more socially acceptable behavior and may have inhibited less acceptable behaviors than is usual in the home situation.

If the experimenter obtained a reasonably close approximation of customary mother-child relationships, however, the findings suggest that maternal behavior of middle-class mothers cannot be predicted from an analysis of maternal attitudes toward children. If the mothers displayed a more socially acceptable type of interaction with the child in the laboratory than is habitual in the home, it could not be ascertained whether such behavior played a predominant role in their relationship or whether it was merely conditioned by the presence of the observer.

It is also possible that the mothers may have exhibited reticence or shyness in a totally unfamiliar situation. This is suggested by the low frequency of both negative and positive behaviors, e.g., *Being Un-cooperative, Criticizing, Giving Permission, Giving Praise or Affection, Helping, Interfering, Interfering by Structurizing, Reassuring,* and *Restricting.* Schalock (10) states that a mother and child spend a large proportion of the time in *Non-attendance* and that the interaction which occurs most frequently on the part of the mother is *Attendant Observation, Statement of Condition or Action, Seeking Impersonal Information, Offering Verbal Information, Directing,* and *Joint Participation in Activity.* In the present study these behaviors make up approximately 90 per cent of the mother's interaction.

Although it is apparent that there are limitations inherent in the type of observational methodology as described in the study reported, e.g., length of time required to train observers; the effect of the observer on the interaction of the subjects, such a method has several advantages when compared to others which are frequently utilized in studies of family interaction. Studies which employed such techniques as rating scales, questionnaires, and interviews have placed, in the investigator's opinion, undue reliance upon the respondents evaluation of the kind of interaction occurring within the family, and have failed to obtain the kind of precise information which direct observation yields. Thus, the literature is replete with studies of relationships which are based upon subjective judgments of individuals who, it is generally recognized, not infrequently yield a less self-incriminating measure than would have been obtained by a trained, objective observer.

The advantage of recording behavior at the moment of occurrence in terms of yielding precise statements is obvious, yet relatively few studies have been undertaken using members of the same family in which their behavior has been rated according to predetermined categories and rated at the time of occurrence. Admittedly, such a technique is expensive in terms of the time required for the data collection. However, until such studies are undertaken in order to determine the behaviors employed by family members in their interaction with others, many of the conclusions of investigators of parental behavior who have made use of the traditional questionnaire, ratings scale, and interview, must be considered tentative.

E. Summary

The purpose of this study were to test the hypotheses that: (*a*) maternal attitudes toward children are significantly related to selected behaviors of mothers, observed in interaction with their children; and (*b*) maternal behavior is independent of the sex of the child with whom the mother interacts.

The subjects were 40 middle-class mothers who were American born, white, between the ages of 20 to 35, had two or more children, and were full-time homemakers. Laboratory observations of mother-child interaction were conducted in the child study laboratory at Texas Woman's University, where there were facilities for observing the mother together with her child through a one-way-vision mirror.

Each mother-child pair came to the laboratory for a 30-minute period for the child to play while his mother stayed in the room with him. The mother's interaction with her child was observed and recorded under predetermined categories.

Contacting, Directing, Lending Cooperation, Observing Attentively, Playing Interactively, Remaining Out of Contact, Structurizing, and *Teaching* constituted the major types of the mothers' behavior toward their children.

Of the 272 comparisons made by means of Spearman rank correlation coefficients computed between frequencies in the seventeen maternal behavior categories and the sixteen attitude subscales, twelve evidenced significant relationships at the .05 level or beyond.

Of the seventeen behavior categories, only two showed a significant relationship with the sex of the child at the .05 level when the median test was applied between frequencies of maternal contacts with sons and daughters.

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The Journal of Genetic Psychology, 1962, **100**, 167-175.

DIFFERENTIAL HAND USAGE IN THREE-YEAR-OLD CHILDREN*

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A. Purpose

Experimental research on hand usage in children has centered around the questions "What is the dominant hand?" and "How soon is dominance established?" (See e.g., 2, 3, 4, 6). The data collected for the purpose of answering these questions has varied from a recording of all spontaneous activity of the child (2, 3, 6) to the observation of a few selected responses such as touching a cube (4) or accepting an object (7). The experimenters who observed a relatively wide range of activities noticed that certain activities were more consistently performed with the same hand, and it was these activities that were empirically selected as the test items for a dominance test (8). The question of *why* a child used his dominant hand more frequently for certain activities than for others was seldom touched upon or was explained by a vague reference to "practice and training" (5). Such an explanation is obviously not applicable to hand use during the first year, where striking differences were observed by Katherine Wolf in the Study Children of the Yale Child Study Center Longitudinal Project. The basis for differential hand use in these babies was varied: one child, for example, used one hand to maintain the *status quo,* to hold and to hoard, and the other to change and manipulate the world. Another child used one hand for autoerotic activities and the other for outwardly directed manipulation. Such observation findings suggested the hypothesis that differential hand usage in young children might be due, at least in part, to whether or not the activity the hand was engaged in was ego-syntonic. In infant observations during the first year, several observers have noted fairly frequent changes in "dominance" (which has been implicitly defined as the hand which most frequently performs whatever group of activities are being recorded). Since the ego-syntonicity of various activities is rapidly changing during this year, it is not impossible that the fairly frequent shifts in "dominance" may be partially due to the changing psychological meaning of the same activities for the babies (as well as to neurological maturation).

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* Received in the Editorial Office April 6, 1960.

This frequently fluctuating "dominance" of the first year is quite different in character from the rather stable preference of later years. The activities chosen for determining dominance in the later years have been neutral, outwardly directed ones, that is, activities that are ego-syntonic for the adult. Dominance, as measured by increasing consistency of hand use for these activities, increases in stability, closely paralleling the developing stability of these activities as ego-syntonic. At the same time, the ego-syntonic activities of the child converge with adult norms. (For example, some autoerotic and aggressive activity is ego-syntonic for the younger child, but not for the older child or the adult). Also, in adult life, roles which reflect an ego-syntonic non-ego-syntonic split may be assigned to the two hands on a cultural basis. For example, the Balinese use the left hand only for cleaning body parts (1).

The following observations were made for two purposes: (1) To determine whether the grouping of activities by ego-syntonicity (as determined *a priori* by adult standards) gave as adequate a determination of dominance as other groupings made on the basis of frequency, motion and skill. Dominance was defined as a statistically significant difference between the two hands in frequency of hand usage. (2) To compare the degree of dominance shown in the ego-syntonic activities with that in the non-ego-syntonic activities with the hypothesis that ego-syntonic activities would show a well defined dominance and that non-ego-syntonic activities would show no dominance or reversed dominance.

B. SUBJECTS AND METHOD

Ten three-year-old children in the Yale University Child Study Center nursery school were each observed for from two to four twenty-minute observation periods.[1] Twenty-seven running records were collected, of which twenty were composite records of two or more observers who watched the same child at the same time. The records merely described as completely as possible what the particular child did during the observation period, with special emphasis on hand usage. Most of the observations were made when the children were engaged in free play, either inside (painting, doll play, block building, puzzles etc.) or outside the nursery school (swinging, jumping etc.), but a few were collected during juice or story time.

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[1] The observations were made in connection with a Yale University Department of Psychology graduate course in child development taught by Dr. Katherine Wolf. The observers were Lee Brehm, Janet L. Brown, Cynthia Fox, David Gallant, William Kessen, Doris Kraeling, John Lovett Jr., Thomas Storm and Sally Wilson.

The observations were scored in the following manner: Each observation for each child was first divided into "scoring units." A scoring unit was defined as any mention of a separate activity in the observation record, e.g., "Dips brush carefully into the blue paint with her right hand/ strokes vertically on the paper/ and stands holding the brush in her right hand as she looks at the teacher" (three units). The scoring units were divided into six content categories:

1. Description. (Static description of any hand position).
2. Own Body Contact. (Touching of child's own mouth, face, head or clothes).
3. Aggression. (Pushing, hitting, shooting guns).
4. Social Contact. (Giving, receiving, social gestures such as pointing, and non-aggressive physical contact with another child, mother or teacher).
5. Object Contact. (Picking up, putting down, manipulating objects).
6. Miscellaneous. (Activities which were less closely related to instinctual drives than Own Body Contact or Aggression, but less definitely neutral. Arbitrarily, these were defined as eating, drinking, playing in dirt or dough, and sensual stroking of the rabbit or rat).

The categories were exclusive. A scoring unit was coded as Object Contact only if it did not fit any other category.

Each scoring unit was then coded under "right," "left" or "both" hands. (Hand use was recorded by the observers for 96.4 per cent of the 2381 scoring units). The 612 scoring units coded under "both" were discarded. Each scoring unit was also coded as to whether it involved movement or was a static description such as "holding," and as to the estimated degree of skill involved in the response (low, medium, or high). Chi squares were then calculated on the hypothesis of a 50-50 split in hand use.

C. RESULTS

1. *The Determination of Dominance*

a. Frequency. A test of dominance on the basis of the simple frequency of mention of hand use showed that for half of the children there were significantly more mentions of one hand than of the other. (Table 1). If the category of Description is omitted, (since the observer's recording of the static hand position was more or less a matter of chance), six of the ten children show this differentiation significantly.

b. Motion. In order to further eliminate the factor of static responses being incorrectly weighted (since several scoring units might occur in one hand while only one unit of "holding" was recorded for the other hand),

TABLE 1
Chi Squares for Right vs. Left Hand, Assuming a 50-50 Split

Child no.	Frequency	Motion	Skill	Ego-syntonicity	Non-ego-syntonicity
	Basis of categorization				
1	4.93*	6.59*	3.05	7.59**	.04
2	2.72	13.73**	12.07**	3.70	2.56
3[1]	2.04	1.39	12.12**	10.09**	2.75
4	0.00	1.35	0.00	1.45	0.00
5[1]	.28	.70	7.69**	4.01*	.52
6	5.04*	6.13*	4.05*	5.83*	5.14*
7	6.64**	9.88**	5.27*	4.79*	.37
8	.60	4.33*	8.52**	7.90**	.90
9	6.52**	9.23**	24.45**	13.04**	.80
10[1]	21.25**	31.96**	31.58**	32.27**	1.56
Number of scoring units:	1684	1187	265	799	224
Number of children significant:	5	7	8	8	1

[1] Left handed children.
* Significant at the .05 level. (Chi square of 3.84 necessary).
** Significant at the .01 level. (Chi square of 6.64 necessary).

the next breakdown was done on the basis of active responses involving movement, and the 497 static responses were discarded. On this measure of frequency of motion with static responses excluded, seven of the ten children had a significantly dominant hand (Table 1).

c. Skill. In order to make a test of skill on the basis of a 50-50 hypothesis, it was necessary to consider only the 265 responses that were of medium or high skill. Eight of the ten children had a significantly dominant hand on the basis of this measure. (Table 1).

d. Ego-syntonicity. As a measure of ego-syntonicity, the frequencies for the categories of Object Contact and Social Contact were combined.[2] As with skill, eight of the children showed a significantly dominant hand. Skill and ego-syntonicity thus seemed about equally sensitive determiners of dominance. (One child was not significantly dominant on either test, one was dominant on skill but not on ego-syntonicity, and one on ego-syntonicity but not on skill.) (Table 1.) As might be expected, there was a good deal of overlap in these two categories: only 25 of the 265 medium or high skilled responses were not among the 799 responses in the ego-syntonic categories.

e. Consistency of dominance. The dominant hand remained the same on all measures for all children, with one exception. (Child No. 5 was slightly right handed on the over-all frequency count, but was left handed on all other breakdowns). Seven of the children were right handed (although for Child No. 4 this never reached significance) and three were left handed.

2. *Differential Hand Use*

Having determined that eight of the children used one hand significantly more than the other in ego-syntonic activities, the next step was to test the hypothesis that this degree of dominance would not hold for non-ego-syntonic activities. As a measure of non-ego-syntonicity, the categories of Own Body Contact and Aggression were combined and a chi square on the hypothesis of a 50-50 split in hand use was computed.[3] The results are shown in Table 1 where it can be seen that only one of the children used his dominant hand significantly more than his other hand for non-ego-syntonic activities. Five of the ten children actually used their non-dominant hand more frequently than their dominant hand for these non-ego-syntonic activities. Our hypothesis is thus strongly supported.[4]

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[2] Even on the basis of adult standards, this category should more properly be labelled "Relatively more ego-syntonic," and the non-ego-syntonic category (to be introduced later) "Relatively more non-ego-syntonic." In three-year-old children, the distinction between ego-syntonic and non-ego-syntonic is probably even less sharp and more uniquely individualized than in adults.

[3] See footnote 2.

D. Discussion

It was shown in Part I of the results that categorizing either by skill or by type of activity tended to give a relatively sensitive measure of dominance. However, coding into either of these categories raises some problems. In general, categorization can be done in either of two ways: first, by *a priori* definition. For example, in this research, non-ego-syntonic activities were *defined* as any contact of the hand with the child's own body or any aggressive response such as hitting, pushing and shooting. Once defined, it was extremely easy and reliable to identify responses in this category and to code them from the written observation record. The difficulty arises in that this *a priori* definition may not be appropriate for the particular child observed at the particular time; perhaps Own Body Touch or Aggression is actually quite ego-syntonic for an individual child, and if this is so, and dominance is closely related to ego-syntonicity, then the measure loses much of its sensitivity. The second possibility is to define only very generally *a priori* and to categorize directly from the minute analysis of the data. Something of this sort was attempted when one response was categorized as "more skillful" than another. Judging skill from a written record turns out to be extremely difficult, however. The observational detail was usually not sufficient for a reliable categorization. Consequently, in practice, skill also tended to be rated on an *a priori* basis, e.g., on the basis that activities such as painting, puzzle making, and block building potentially required more skill than other activities, they were rated as of high or medium skill unless there was any specifically contradictory material in the record. This accounts partially for the overlap between the skill and ego-syntonic categories. It also severely limits the number of responses categorized as of high or medium skill if, during the observation period, the child does not engage in any of the activities which are *a priori* regarded as skillful. Categorization and determination of dominance by ego-syntonicity does not suffer from this limitation since Object Contact consistently contains the highest frequency of responses. It therefore appears that the use of ego-syntonic activities (defined *a priori* as Object Contact and Social Contact) gives a relatively high frequency of responses on which to base a dominance estimate from free activity. Using such a large number of responses also has the advantage of compensating for responses that are made primarily because of the position of the child or the object, or are made with one hand because the other hand is already occupied.

As mentioned above, *a priori* definitions of ego-syntonicity may not be completely appropriate, except as rough guides, because of the variation in the ego-syntonicity of the same activity for different young children. If instead of *a priori* definitions, we "let the behavior speak," we find some suggestive differences in the individual children (though these are necessarily tentative because of the small frequencies involved). For example, six of the children mouthed, two rather intensely and four only peripherally during quiet or "in-between" periods. The intense mouthers used their dominant hand less for mouthing than for ego-syntonic activities (one significantly so by four-fold chi square); for them, mouthing seemed to be quite definitely non-ego-syntonic. Two of the peripheral mouthers, on the other hand, actually used their dominant hand as much for sucking as for ego-syntonic activities; for them, mouthing was not necessarily non-ego-syntonic. Or, for another example, two of the boys did a good deal of shooting in cowboy play. One boy practically always used his non-dominant hand for this activity. The other boy used his dominant hand, with one exception: when he aimed directly at another child he used his non-dominant hand. The activities in the Miscellaneous category (No. 6) also showed this differential nature. For most of the children, there was no particular difference in hand use between these activities and the ego-syntonic activities, but dirt play for one child and dough play for another, did appear to be non-ego-syntonic.

If differential hand use provides a method of ascertaining what activities are ego-syntonic and non-ego-syntonic for an individual child at a particular time, the longitudinal description of hand usage for the individual child would provide an excellent tool for research in genetic and dynamic personality description.

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[4] The question may be raised as to whether the children used their dominant hand less for ego-syntonic activities because it was already occupied at that time. A check on the observations shows that this was true in only eight of the 224 responses that were coded as non-ego-syntonic. In the other 216 instances, there was a free choice.

The question may also be raised as to whether this finding merely indicates that low skilled activities are performed with the non-dominant hand (since most of the non-ego-syntonic activities were of low skill). Although it is impossible to rule out the effect of skill completely, a comparison of the proportion of dominant hand use on non-ego-syntonic activities vs. low skillful ego-syntonic activities, indicates that for seven of the ten children, the proportion of dominant hand usage is higher on the low skilled ego-syntonic activities than it is on the non-ego-syntonic activities, and on two others about the same as on the non-ego-syntonic activities. This suggests that there is a real difference in the nature of ego-syntonic and non-ego-syntonic activities, independent of the skill involved.

E. Summary

Ten three-year-old nursery school children were observed during free play with special emphasis on hand usage. The 2381 scoring units were dichotomized according to which hand was involved (units involving both hands were omitted), and rated on: (*a*) whether or not the response involved motion; (*b*) the degree of skill involved; and (*c*) the content of the activity. Content was categorized into Description, Own Body Contact, Aggression, Social Contact, Object Contact and Miscellaneous. The categories of Own Body Contact and Aggression were combined into a "non-ego-syntonic" grouping, and the categories of Object Contact and Social Contact were combined into an "ego-syntonic" grouping. Chi squares on the hypothesis of a 50-50 split in hand use were computed with the results that:

1. Half the children used one hand significantly more than the other on the basis of over-all frequency count alone.

2. Six of the ten children used one hand significantly more than the other on the basis of scoring units involving active, moving responses.

3. Eight children used one hand significantly more than the other for both skilled activities and ego-syntonic activities. On the other hand, only one child used his dominant hand significantly more than his non-dominant hand for non-ego-syntonic activities and five of the children actually used their non-dominant hand more than their dominant hand for non-ego-syntonic activities. This was not due to the fact that the dominant hand was already occupied or that the non-ego-syntonic activities were of low skill. The hypothesis that differential hand usage is, in part, a function of the ego-syntonicity of the activity the hand is engaged in, is thus strongly supported.

The relative advantages of the use of skill or ego-syntonicity as determiners of dominance were discussed, as was the utilization of differential hand use as a tool for the genetic and dynamic description of personality.

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THE JOURNAL PRESS
2 Commercial Street
Provincetown, Massachusetts
U. S. A.

$20.00 per year
$15.00 per volume
Single Numbers $7.50

QUARTERLY
Two volumes per year

June, 1962
Volume 100, Second Half

Founded by G. Stanley Hall in 1891, reorganized by Carl Murchison in 1925

THE JOURNAL OF GENETIC PSYCHOLOGY

Child Behavior, Animal Behavior, and Problems of Aging

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JUNE, 1962

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Entered as second-class matter May 11, 1937, at the post-office at Provincetown, Mass., under the Act of March 3, 1879
Second-class postage paid at Provincetown, Mass.

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The Journal of Genetic Psychology, 1962, **100**, 183-192.

POSITIONAL AND FIGURAL ERRORS MADE BY THE AGED ON RAVEN COLOURED PROGRESSIVE MATRICES*[1]

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A. Introduction

Mistakes often serve as a mirror in which to see the way a person looks at himself and the world around him. Errors, in the opinion of this author, are frequently more revealing of personality than "correct" decisions, choices and acts.

There are many reasons why this is true. "Correct" choices are generally predetermined by cultural forces and reinforced by the approval of one's own group. Incorrect decisions or "mistakes" while also influenced by culture, are not influenced to as great an extent. This errant position is difficult not only for the person making wrong choices but for those in his surroundings. Such a person is likely to have many personality idiosyncrasies and to be less susceptible to cultural pressures.

The study described in this paper is based upon the hypothesis that an examination of the errors made by the aged subjects who participated in it, would produce some insight into their patterns of thinking and their way of responding to abstract stimuli as well as to the world around them. It is our opinion that too much emphasis is generally placed upon factors external to the test situation such as to the attitude of the subjects to the task at hand, to motivation, interest, kind of task materials with which the subjects work, etc. Our emphasis has rather been directed toward inner factors such as the thinking patterns of the subjects and the cultural influences which molded and established these patterns during their early years. It has been our contention that an understanding of such inner factors is more important in evaluating the test performance of these subjects, than the external factors referred to above.

B. Progressive Matrices

One of the problems commonly encountered in working with aged subjects is the hostility aroused by testing materials that seem childish or belittling to them. Many examiners report this reaction from aged subjects

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* Received in the Editorial Office on May 13, 1960, and given prior publication in accordance with our policy regarding manuscripts on the subject of aging.

[1] The writer wishes to acknowledge the assistance of Miss Nina Koch, who assisted in preparing the tables for this manuscript.

to whom the usual intelligence test items are administered, regardless of how valid or reliable these items may otherwise be. No such response or resistance was provoked by the Raven Coloured Progressive Matrices. Instead, most of the subjects with whom this researcher and his students worked, seemed to like the test. The matrices were accepted and seemed to present enough challenge to produce feelings of gratification in the subjects who achieved success. Certainly low scores on the CPM could not be attributed, as they often are in other such tests given to the aged, to lack of motivation. It is to be recalled that the CPM testee can progress at his own rate of speed without penalty and that the problems clearly presented in the matrices are highly visible, minimizing the difficulties which arise from failing eyesight.

The Raven Coloured Progressive Matrices were, therefore, selected for this study. There are three book forms of Matrices: (*a*) Advanced Progressive Matrices, Sets I and II; (*b*) the Standard Scale consisting of five sets—A, B, C, D, and E; and the Coloured Progressive Matrices (CPM), the form used in the study reported here. The CPM consists of the problems of Sets A and B (black and white) of the Standard Scale which had been printed on brightly coloured backgrounds, and an additional set, Ab. Set Ab was introduced to bridge the gap between Sets A and B by providing some transitional problems between the easy tasks in Set A and the more difficult ones in Set B. Each set has twelve items. Six positional choices (one of which is correct) are provided for the completion of each item. The correct choice is randomly distributed in every set in such a way that it appears twice in the same position for one set of problems of 12, and six times in each position in three sets consisting of 36 problems.

According to Raven (5, p. 32), Set A measures "the apprehension of identity and change in continuous patterns." Set Ab measures "the apprehension of discrete figures as spatially related wholes." Set B measures "the apprehension of analogous changes in spatially and logically related figures." The type and nature of errors are classified by Raven as follows: (5, p. 30). (See Table 1.)

Raven suggests that CPM be administered to those individuals in whom "the capacity to form comparisons and reason by analogy . . . . has failed to develop or has since become impaired" (5, p. 10). The Matrices are "a valuable test for old people" (6, p. 2).

C. Previous Research

Raven has a detailed discussion of children's positional errors and erroneous choices on the Board form of the test. He notes that as the "ability to solve the problems increases, the distribution of erroneous choices over the six possible positions becomes more uniform, although Position 2 tends always to be chosen slightly more often than Position 1, twice as often as Positions 3, 5 and 6, and three times as often as Position 4" (5, p. 19). He indicates that attempts have been made to minimize the effect of position by rearranging the alternatives from which a choice could be made. He reports findings that scores on Matrices are at a maximum at about fourteen, remain stationary for approximately ten years, and then begin to decline slowly and uniformly (6, p. 4). Raven attributes this decline to the fact that "ability to reason by analogy" is the earliest one to decline in life. Further, since he feels that his test measures "productive thinking" the reason given for the negative correlation between age and CPM scores is that a "normal *old person* (italics his) is no longer capable of productive intellectual activity" (5, p. 27).

TABLE 1
THE TYPE AND NATURE OF ERRONEOUS FIGURES FROM WHICH A CHOICE IS MADE

Difference	a	The piece has no figure of any kind on it
	b	The figure shown is quite irrelevant
Inadequate Individuation	c	The figure is contaminated by irrelevancies or distortions
	d	It combines figures irrelevantly
	e	It is the whole or half the pattern to be completed
Repetition of the pattern	f	Above and to the left of the space to be filled
	g	Immediately above the space to be filled
	h	Immediately to the left of the space to be filled
Incomplete correlate	i	The figure is wrongly orientated
	j	It is incomplete, but correct as far as it goes

D. Problems

Are there any differences in the positional choices of aged 60-69 as compared to those 70-84?

Are there any differences in the type of figural errors made by aged 60-69 as compared to those 70-84?

E. Procedure

CPM was administered to 147 men and women ranging in age from 60 to 84. These men and women were volunteers selected from golden age clubs (day centers) run by the New York City Department of Welfare.

This sample is not representative of the aged of New York City in respect to intellectual level, socio-economic background or cultural identification. Golden age clubs attract a selective group (1) and a large number of the sample used were receiving public assistance. All available suitable subjects were examined.

Anyone was excluded who evidenced sensory and motor deficiencies which prevented his completing the CPM. Persons exhibiting deviant behavior were also eliminated.

Table 2 gives us the location of the erroneous responses made by the aged. We may note that their positional choices are as follows: 2, 5, 1, 4, 6, 3. The medial positions are chosen by 40.75 per cent. The left lateral by 32.65 per cent followed by the right lateral which gets 26.60 per cent. These differences in positional choice are significant at the .01 level of confidence.

An examination of Table 2 also indicates that there is an increase in erroneous choices made by aged with advancing age. It is also interesting to note that the group 60-64 has a lower mean CPM score than the 65-69 group. This is contrary to previous findings with this test when administered to aged subjects (2, 4). Apparently selective factors entered into this sample which contaminated the results. Possibly at the time these subjects were examined those below 65 who were available, were unemployable and thus possibly somewhat inferior in intelligence to those who retired at 65-69. In this connection, it is to be remembered that it is not age *per se* which determines our reaction to psychological tests but factors concomitant with age. Another possible factor to be considered is that this is an heterogeneous sample. A recent study by the writer indicates that Jewish women secure lower WAIS scores than Jewish men (3) of similar socio-economic and ethnic backgrounds. Possibly this same factor holds true for the CPM.

We then decided to investigate whether there is a statistically significant shift in positional preferences between aged 60-69 and those from 70-84. We find that there is no change in rank order of preference for position. However, we do find some accentuation of the medial position from 40.13 per cent of choices to 41.39 per cent of choices and some reduction in the choice of the right lateral from 27.15 per cent to 26.00 per cent.

F. Errors

Table 3 presents the errors made on the CPM by the aged, classified according to age. This table presents the actual number of errors made. They are not corrected for the "frequency of presentation of each item."

TABLE 2

Positional Errors of Aged

		Choices		Positions												
				1		2		3		4		5		6		
Age	N	Right	Wrong	N	%	N	%	N	%	N	%	N	%	N	%	Total errors
60-64	40	23.52	12.48	87	17.43	100	20.04	68	13.63	78	15.63	92	18.44	74	14.83	499
65-69	43	24.84	11.16	87	18.13	103	21.45	64	13.33	68	14.17	98	20.41	60	12.50	480
70-74	33	22.52	13.48	80	17.98	95	21.35	40	8.99	81	18.20	86	19.33	63	14.16	445
75-79	23	20.87	15.13	59	16.95	83	23.85	49	14.08	53	15.23	54	15.52	50	14.37	348
80-84	8	19.75	16.25	20	15.38	30	23.08	13	10.00	8	6.15	34	26.15	25	19.23	130
Total	147	23.06	12.94	333	17.51	411	21.61	234	12.30	288	15.14	364	19.14	272	14.30	1902

This sample is not representative of the aged of New York City in respect to intellectual level, socio-economic background or cultural identification. Golden age clubs attract a selective group (1) and a large number of the sample used were receiving public assistance. All available suitable subjects were examined.

Anyone was excluded who evidenced sensory and motor deficiencies which prevented his completing the CPM. Persons exhibiting deviant behavior were also eliminated.

Table 2 gives us the location of the erroneous responses made by the aged. We may note that their positional choices are as follows: 2, 5, 1, 4, 6, 3. The medial positions are chosen by 40.75 per cent. The left lateral by 32.65 per cent followed by the right lateral which gets 26.60 per cent. These differences in positional choice are significant at the .01 level of confidence.

An examination of Table 2 also indicates that there is an increase in erroneous choices made by aged with advancing age. It is also interesting to note that the group 60-64 has a lower mean CPM score than the 65-69 group. This is contrary to previous findings with this test when administered to aged subjects (2, 4). Apparently selective factors entered into this sample which contaminated the results. Possibly at the time these subjects were examined those below 65 who were available, were unemployable and thus possibly somewhat inferior in intelligence to those who retired at 65-69. In this connection, it is to be remembered that it is not age *per se* which determines our reaction to psychological tests but factors concomitant with age. Another possible factor to be considered is that this is an heterogeneous sample. A recent study by the writer indicates that Jewish women secure lower WAIS scores than Jewish men (3) of similar socio-economic and ethnic backgrounds. Possibly this same factor holds true for the CPM.

We then decided to investigate whether there is a statistically significant shift in positional preferences between aged 60-69 and those from 70-84. We find that there is no change in rank order of preference for position. However, we do find some accentuation of the medial position from 40.13 per cent of choices to 41.39 per cent of choices and some reduction in the choice of the right lateral from 27.15 per cent to 26.00 per cent.

F. ERRORS

Table 3 presents the errors made on the CPM by the aged, classified according to age. This table presents the actual number of errors made. They are not corrected for the "frequency of presentation of each item."

TABLE 2

POSITIONAL ERRORS OF AGED

		Choices		Positions												
				1		2		3		4		5		6		
Age	N	Right	Wrong	N	%	N	%	N	%	N	%	N	%	N	%	Total errors
60-64	40	23.52	12.48	87	17.43	100	20.04	68	13.63	78	15.63	92	18.44	74	14.83	499
65-69	43	24.84	11.16	87	18.13	103	21.45	64	13.33	68	14.17	98	20.41	60	12.50	480
70-74	33	22.52	13.48	80	17.98	95	21.35	40	8.99	81	18.20	86	19.33	63	14.16	445
75-79	23	20.87	15.13	59	16.95	83	23.85	49	14.08	53	15.23	54	15.52	50	14.37	348
80-84	8	19.75	16.25	20	15.38	30	23.08	13	10.00	8	6.15	34	26.15	25	19.23	130
Total	147	23.06	12.94	333	17.51	411	21.61	234	12.30	288	15.14	364	19.14	272	14.30	1902

TABLE 3
Figural Errors of Aged

Age	A N	A %	B N	B %	C N	C %	D N	D %	E N	E %	F N	F %	G N	G %	H N	H %	I N	I %	J N	J %
60-64	1	.20	25	5.01	12	2.40	11	2.20	27	5.41	44	8.82	190	38.08	114	22.85	22	4.41	53	10.62
65-69	4	.84	24	5.00	23	4.79	10	2.08	18	3.75	43	8.96	166	34.58	106	22.08	29	6.04	57	11.87
70-74	3	.67	18	4.04	13	2.92	7	1.57	12	2.70	42	9.44	140	31.46	118	26.52	23	5.17	69	15.50
75-79	3	.86	14	4.02	21	6.03	2	.57	19	5.46	33	9.48	111	31.90	76	21.84	24	6.90	45	12.93
80-84	0	0	2	1.54	12	9.23	5	3.85	5	3.85	17	13.08	44	33.85	21	16.15	11	8.46	13	10.00
Total	11	.58	83	4.36	81	4.26	35	1.84	81	4.26	179	9.41	651	34.23	435	22.87	109	5.73	237	12.46

We may note that there is a tendency for certain types of errors to increase and for others to decrease. In order to see whether there are trends in the kinds of errors made and whether these are statistically significant, we combined the errors into error categories as suggested by Raven.

We further separated the errors into two categories: sensible and senseless. Sensible errors were considered those falling into categories: F, G, H, and J. All others were considered in the senseless category.

We compared the two groups 60-69 and 70-84. We felt that evidence of senile decline, as noted by Orme (4) and Raven (5) would certainly be found when the performance of these two aged groups was compared.

However, when we analyzed the data in Table 3, we noted that while there was a statistically insignificant decrease in "repetitive" errors (F, G, H) from 663 (67.1 per cent) at ages 60-69 to 602 (65.22 per cent) at ages 70-84, there was a compensatory increase in error J from 110 (11.24 per cent) to 127 (13.76 per cent). There was thus no significant change in sensible errors. What occurred was an insignificant change in the *type* of sensible error made by the aged.

G. Discussion

1. *Positional Preference*

We found that the positional preferences of the aged are as follows: medial, followed by left lateral and, finally, right lateral. Further, that the individual positional preferences of aged are not the same as that of children. Various hypotheses may be advanced for this particular sequence of choices. None of them, in the writer's opinion, offer a complete or satisfactory explanation.

Possibly, the popularity of the medial choice may be due to the fact that we read from left to right. When almost at first glance we see a choice which seems accurate, we select it. Or, it may be that in a moment of indecision we tend to choose the left lateral position if the medial or the right lateral choices appear incorrect.

Due to psychological, social, and experiential changes concomitant with age, there may be less tolerance for ambiguity and a diminishing of those creative choices which are triggered by uncertainty. Making a medial choice may symbolize the safety of being "in the middle"—just like everyone else. This also reduces the possible number of answers—thus simplifying the choice. This hypothesis may be strengthened by the paucity of answers pointing to the right and hence off the book into the unknown.

At any rate, it seems to us that CPM should be restandardized, that the order of the correct choices should be rearranged in order to avoid the positional errors of the aged serving to produce correct answers by accident.

2. *Increase in Errors and Change in Type of Errors*

Raven, as noted previously, attributes the increase in errors to the decreasing capacity of the aged to engage in "productive thinking." Such an explanation, it seems to us, begs the entire question. It seems to us that the erroneous choices of the aged are made regardless of whether CPM does, or does not, measure intellectual ability at their ages. "Productive thinking" has to be defined or related in its meaning to the thinker. How significant is this performance to the aged in the light of their present circumscribed life, and in the light of the context of their total life's experiences?

Other factors influence the picture, such as life's experiences, attitudes, etc., which are likely to be even more important. It seems to us that at this age, even more than at any other age, CPM also taps non-intellective abilities and that these influence the performance of the aged.

Let us try to arrive at some tentative explanation which makes psychological sense of this phenomenon. In this context we can disregard the concept that rigidity in old age is due to lack of security in a new activity, or a desire to continue in an old and successful one. In our study, it is true, the factors involved were new to the aged. However, choice of any answer did not endanger their security outside of a possible one of threat when fear of wrong answers were given. There was also an interest in the activity. The fact must be considered that their culture was somewhat different from that of the general population upon which the test was standardized (5, p. 7).

Further, these were active aged men and women who were largely interested in life and their activities in the golden age clubs. We do not know how comparable they were in this respect to the sample studied by Orme (4). These factors, as well as possible normal decline with age, have to be explored before we may arrive at an adequate understanding of our findings.

We noted that there was some statistically insignificant decrease in "repetitive" errors. Raven suggests on the basis of his evaluation of Orme's (4) study of normal old people, and elderly depressive and senile patients that "it is partly this strong repetitive tendency" which helped preserve whatever intellectual abilities and social adaptiveness they had past the age of 70. It seems to us however, that the term "repetitive tendency" is

a misleading one. The aged man is looking for an answer, if not the exact one, at least a reasonable one.

It is not possible that the lower accuracy score and a slightly different pattern of sensible errors reflect the beginning of different ways of thinking from that of middle age, thinking that is quite adequate for this group and which is in conformance with their needs. Must we not judge performance whether on tests or elsewhere in terms of functional utility for a certain group? What about the differences of these groups in terms of their problem solving behavior?

It is quite possible that similar findings may indicate aberrant thinking on the part of children. However, the phenotype of the same score does not indicate that the genotype of thinking is the same. In other words, while a certain finding may be valid for children, we cannot automatically equate it to be equally valid with adults. We cannot compare old age to childhood.

We cannot, on psychological grounds, decide that the old man is rigid, or his thinking is inflexible, simply because he makes the same type of error as a young child.

Generally speaking, deducing the same psychological meaning from identical scores on a test by children and aged, is hazardous, if not psychologically meaningless. The psychological meaning of any test scores depends, to a very great extent, on a host of factors which may have very little to do with statistical norms no matter how adequate. In childhood, a young person is looking forward, is interested in exploring new data and new material. In old age (after 70, if we are to accept Raven's dividing line), a person, due to cultural, social and physical pressures, may begin to look back and ruminate over old experiences. This may create a different set for the test. The aged will thus tend more and more to select an answer which, though erroneous, is more similar to the looked for correct choice and is not merely "repetitive" of part of a design. Variation in the type of sensible error chosen may also indicate that the aged subject is still maintaining an interest in the world and is trying to establish or reestablish contact with the environment.

Other investigators (4, 5) noted that the senile patient and the depressive give us an increased number of senseless errors and fewer sensible errors. We agree that this indicates the presence of perceptual, conceptual and cognitive disturbances, and hence a haphazard choice of an answer to a problem which may not be either too meaningful or too important. However, we are at a loss to understand why these results are also attributed to an aging process *per se.* Would not these findings also be true of organic and/or emotionally disturbed patients at adolescence or young adulthood?

Generally speaking, would not the increase in nonsensical errors also indicate some loss of ability to differentiate between figure and background, or possibly a reversal of figure and background, findings often seen in the performance of organics at any age? The above, it seems to us, indicates a need for redefining the meaning of "aging" and for correlating different types of errors on the Matrices and similar tests with the activities, thinking, adjustment and *joie vivre* of the aging individual.

H. Summary

A study was made to learn whether there were any significant differences in the positional choices and figural errors made on CPM by aged 60-69 (N—83) as compared to those 70-84 (N—64). There was no significant change in the rank order preference.

Their positional choices were different than those made by children. The medial position was preferred (40.75 per cent). This was followed by the left lateral (32.65 per cent) and right lateral (26.60 per cent). There was no significant decrease in sensible errors with age although there was a statistically insignificant decrease in "repetitive" errors made by the 70-84 group.

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The Journal of Genetic Psychology, 1962, **100**, 193-203.

SOME CORRELATES OF PREJUDICE TOWARD NEGROES IN ELEMENTARY AGE CHILDREN*[1]

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A. The Problem

In searching for personality and environmental characteristics which are correlates of prejudice in children, Harris, Gough and Martin (4), Mussen (6), and Sherif and Sherif (7), conducted research which provided indirect support for the frustration-aggression hypothesis of Dollard, Doob, Miller, Mowrer and Sears (2). Lawson and Marx (5) have summarized some of the theoretical modifications of this hypothesis. These modifications tend to show particular concern with the thesis that aggression is always a consequence of frustration. Allport (1) sees prejudice as a form of aggression and defines frustration in terms of goal-response interference, as do Dollard and his associates. Acknowledging the value of a frustration-aggression-displacement sequence for understanding the nature of prejudice, Allport distinguishes between the kind of frustration which may lead aggression to be displaced as prejudice, and the kind of frustration which may trigger an attempt to deal directly with the interference, as in problem-solving. He labels the former felt frustration and the latter objective frustration. Felt frustration appears to be the inability of an individual to achieve goals which he has set for himself. Objective frustration appears to be the inability of an individual to achieve goals which others (teachers, parents, peers, the society in general) have set for him, and with which he is not personally very deeply involved.

The present study has two purposes: (1) To examine as possible correlates of prejudice in children, some personality and environmental characteristics which have not previously been examined: specifically, satisfaction with self, and academic achievement. (2) To test Allport's hypothesis that felt frustration is closely related and objective frustration

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* Received in the Editorial Office on April 8, 1960.

[1] This paper is based on a dissertation submitted to Stanford University in partial fulfillment of the requirements for the Doctor of Education degree. The author wishes to thank Professors Fannie R. Shaftel, Pauline S. Sears, and Frederick J. McDonald for their encouragement and their critical evaluations of this study.

negligibly related to prejudice. In order to achieve these purposes, three hypotheses were tested: (*a*) Prejudice will vary systematically with the degree of satisfaction with self in children. (*b*) This relationship will be such that children who are more satisfied with themselves will be less prejudiced than children who are less satisfied with themselves. (*c*) Prejudice will not vary systematically with a measure of objective frustration, such as achievement in school subjects (with and without intelligence controlled).

B. Method

1. *Subjects*

The fifth grades of six elementary schools in a suburban community in the San Francisco Bay Area provided the subjects for the study. Early in the fourth-grade year, these children were given the California Test Bureau Test of Mental Maturity, Short Form. The California Test Bureau Achievement Battery, Form CC (reading and arithmetic), was administered at the beginning of the fifth-grade year. Measures of satisfaction with self and prejudice were collected near the end of the fifth-grade year from 430 children. One hundred twenty-eight of these children were eliminated from the sample because either intelligence or achievement data were not available for them. This made it probable that children in the sample had had two consecutive years of attendance in the school district.

All of the children in the sample are Caucasian. There were no Negro children enrolled in any of their classrooms. Although the principals of each of the schools informally identified their school populations as representing lower-middle and upper-lower class families, the effects of differences in social class, religious, and nationality backgrounds must be considered to be uncontrolled.

Of the 302 *S*s, 151 are boys and 151 girls. This precise division by sex was the result of chance. Mean IQ for the total sample was 105 with a standard deviation of 14.

2. *Procedures*

In order to determine each child's degree of prejudice toward Negroes, teachers administered the Gough, Harris, Martin, and Edwards prejudice index to the fifth-grade classrooms which provided the *S*s for the study. This index (referred to as GHME-index hereinafter) consists of twelve favorable and six unfavorable statements about a designated minority group; in the present case, "Negro people." Children are directed to agree or disagree with each statement, receiving one point for each favorable statement with which they agree and one point for each unfavorable statement with which they disagree. The lower the score, the greater is the degree of prejudice toward the specified group. A more detailed description of the GHME-index, including validity and reliability data, appears elsewhere (3).

Felt frustration was measured through the use of a self-concept inventory (unpublished) developed by P. S. Sears and her associates at the Stanford University Laboratory of Human Development. Children are asked to check "yes" or "no" in response to the question, "Am I pretty well satisfied with myself in this?" This response is made to ten statements in each of ten major categories. "No" responses are assumed to indicate areas of felt frustration. The ten satisfaction-with-self categories are listed below, together with three of the ten short phrases which denote each category.

Category I: Physical Ability and Appearance	being good at sports; being attractive, good-looking; doing outdoor activities—hiking, camping, riding, swimming
Category II: Mental Activity	learning things rapidly; remembering what I've learned; having new, original ideas
Category III: Social Relations—Boys	controlling my temper with boys, making friends easily with boys, being a leader—the one to get things started with boys
Category IV: Social Relations—Girls	controlling my temper with girls; making friends easily with girls; being a leader—the one to get things started with girls
Category V: Social Relations—Parents	being able to take orders from parents without resenting it; being able to talk to parents easily; feeling that parents have confidence in me
Category VI: Social Relations—Teachers	being able to take orders from teachers without resenting it; being able to talk to teachers easily; feeling that teachers have confidence in me
Category VII: Work Habits	getting my school work in on time, and not getting behind; getting assignments straight the first time; spending most of my time on my work, not goofing off

Category VIII: Personality—Social Virtues	being willing for others to have their way sometimes; making other people feel at ease; understanding other people . . .
Category IX: Personality—Happy Qualities	being confident, not shy or timid; being satisfied with what I do; not expecting everything I do to be perfect; getting along without worrying too much
Category X: School Subjects	doing arithmetic work; doing library reading at home; taking part in class discussions

The items within a category are distributed throughout the instrument. Responses to Categories III and IV are reported as Social Relations-Opposite Sex and Social Relations-Same Sex.

The Self-concept Inventory has construct validity. Over-all split-half reliability is .94, determined after administering the instrument to two fifth-grade classes. Split-half reliability for each of the categories ranges from .72 to .91 with the exceptions of Category X: School Subjects, for which reliability is .69 (uncorrected); and of Category IX: Personality—Happy Qualities, for which reliability is .68 (uncorrected).

Each of the thirteen participating teachers administered the instruments to his own class, with the exception of one class in which the principal performed this function because the teacher was ill. All directions, as well as each of the items to which children were asked to respond, were read aloud so that any effects due to reading difficulties would be at a minimum. Teachers introduced the instruments by saying:

> Scientists at Stanford University are trying to find out more about what children think about other people and more about what children think about themselves. The more that they can learn about children, the better they are able to plan successful ways to teach them. I am going to ask you to answer some short questions. This is *not* a test. Nothing that you write will have anything to do with your grades in any way. Only the scientists who are working on this will see your papers. As soon as they are all collected, they will be put into a large envelope. The envelope will be sealed and sent to Stanford.

When the instruments had been distributed, teachers said:

> Write your name at the top of the page. After your name write *Boy* if you are a boy; write *Girl* if you are a girl. Write the date. Read the directions to yourselves as I read them aloud. "Below are some sentences about *Negro People*. In the column to the right of each sentence, check whether you agree or disagree with the sentence." I will read each of the 18 sentences on this page out loud. Check the box marked *agree* if you agree with the sentence; check the box marked *disagree* if you do not agree with the sentence.

When the GHME-index had been completed, teachers said:

> Now turn the page and read the directions to yourselves as I read them aloud. "Every one of us has some strong points and some weak points. As you come to the end of another school year, it is often a good idea to have a look at yourself and decide what your strong points are and what your weak points are. This gives you an idea of how much you have grown since last year. It also makes it easier to decide where you would like to improve. On the following pages, many different kinds of activities are listed. To the right of these activities is a column which asks you to think about and answer the question, "Am I pretty well satisfied with myself in this area?" Everybody has areas in which he *does* feel pretty well satisfied and other areas in which he is *not* satisfied with himself. Check *yes* if you feel pretty well satisfied, *no* if you are not very satisfied. Let's turn the page. I will read the words after each number out loud. You check *yes* if you are pretty well satisfied with yourself in this; check *no* if you are not very satisfied.

In order to dramatize the privacy of children's responses, teachers sealed, in class, the envelopes containing the completed papers and had them taken to the principal's office.

C. Results and Discussion

1. *Prejudice and Felt Frustration*

The first hypothesis predicts that prejudice will vary systematically with the degree of satisfaction with self in children. This hypothesis was tested by correlating scores on the GHME-index with scores on the Self-concept Inventory. Each child received a score for each of the ten satisfaction-with-self categories equal to the number of times he checked "no" ("not satisfied with myself in this") for that category. These ten scores were summed to give each child a total Self-concept Inventory score. The higher the score, the less satisfied a child indicated himself to be in each category or on the total inventory.

Each of the ten categories of the Self-concept Inventory, the total Self-concept Inventory score, and the Average Grade Level Achievement[2] were treated as independent variables. Each was correlated with the dependent variable, prejudice. Table 1 summarizes the results of these correlations.

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[2] A child's Average Grade Level Achievement $= \frac{\text{Reading G.L.A.} + \text{Arithmetic G.L.A.}}{2}$

TABLE 1
SUMMARY OF CORRELATIONS BETWEEN PREJUDICE AND CATEGORIES OF THE SELF-CONCEPT INVENTORY, THE TOTAL SELF-CONCEPT INVENTORY SCORE AND AVERAGE GRADE LEVEL ACHIEVEMENT FOR 302 FIFTH-GRADE CHILDREN

Self-concept categories and average grade level achievement	*r* with prejudice	P <
Satisfaction with physical abilities	—.10	N.S.
Satisfaction with mental abilities	—.14	.02
Satisfaction with social relations: Opposite sex	—.15	.01
Satisfaction with social relations: Same sex	—.21	.001
Satisfaction with social relations: Parents	—.12	.05
Satisfaction with social relations: Teachers	—.14	.02
Satisfaction with work habits	—.09	N.S.
Satisfaction with personality: Social virtues	—.27	.001
Satisfaction with personality: Happy qualities	—.17	.01
Satisfaction with school subjects	—.13	.05
Total self-concept inventory score	—.22	.001
Average grade level achievement	—.01	N.S.

All of the coefficients of correlation are negative, indicating that children who scored lower on the GHME index (high in prejudice) tended also to score higher on the Self-concept Inventory (dissatisfied with themselves). In order of their strength, the strongest relationships discovered were those between prejudice and satisfaction with Personality—Social Virtues, between prejudice and the total satisfaction with self score, between prejudice and satisfaction with social relations with peers of the same sex. With the exception of the total Self-concept Inventory score, satisfaction with self in categories dealing with social relations with peers and with personality were correlated most highly with prejudice.

Three of the correlation coefficients are not significant statistically. They are those between prejudice and satisfaction with physical ability and appearance, between prejudice and satisfaction with work habits, between prejudice and Average Grade Level Achievement.

Since several investigators have discovered differences in basic personality structure between prejudiced and non-prejudiced children (3, 6), and since attitudes of prejudice commonly direct specific kinds of social behavior, it is perhaps to be expected that satisfaction with self in categories of the Self-concept Inventory dealing with personality characteristics and social relationships should be more readily identified as correlates of prejudice than the other categories of the Self-concept Inventory. Possibly the most intriguing of the discovered relationships, however, is that between prejudice and satisfaction with personality-social virtues. The phrases in this category suggest a personality which is socially accepting of and non-threatening to others. The more prejudiced children in the sample, then, appear to be expressing dissatisfaction with their inability to behave like non-prejudiced people. It may be that these children are simply unaware of the relationship between the characteristics described in Category VIII and non-prejudiced behavior. Their responses might reflect the confusion of inconsistent and conflicting directives for behavior transmitted by our society in general; their responses may point to their understanding of a set of socially approved behaviors to which they would like to conform, but cannot.

It is also interesting to note the differences in strength of the relationship between prejudice and satisfaction with social relations with peers as compared with that between prejudice and satisfaction with social relationships with parents and teachers. The results suggest that dissatisfaction with social relations with peers is more likely to be associated with prejudice in children than are similar feelings about social relations with parents or teachers. However, responses from all *S*s indicate a high degree of satisfaction with social relations with parents and teachers. Whether all these children were in fact relatively equally (and highly) satisfied with these relationships, or whether any of these responses are "guarded" from fear of reprisals, can merely be the subject of speculation. Since Gough *et al.* (3) report that prejudiced children tend to be "more constricted, cynical and fearful, less confident and secure and more suspicious" than less prejudiced children, it might be hypothesized that whatever responses were "guarded" might more likely have been those of more prejudiced rather than those of less prejudiced children. No support for such a hypothesis is presented here.

The summary of relationships in Table 1 seems largely to support the first hypothesis, since satisfaction with self in eight of the ten categories of the Self-concept Inventory was found to vary systematically with prejudice in children, even though all of the coefficients of correlation were low. The second hypothesis, predicting that children who are more satisfied with themselves will be less prejudiced than children who are less satisfied with themselves, seems to have been fully confirmed, since all of the coefficients of correlation are negative.

Allport's hypothesis that felt frustration is positively related to prejudice has been supported. The next section examines his further contention that objective frustration is negligibly related to prejudice.

2. *Prejudice and Objective Frustration*

The third hypothesis predicts that even if prejudice and satisfaction with self (felt frustration) are found to vary together systematically, a similar relationship will not exist between prejudice and some measure of objective frustration. Children were placed in one of three groups on the basis of Average Grade Level Achievement with intelligence controlled. These groups, called Under-Achievers, Normal-Achievers, Over-Achievers, were considered to contain *S*s with High, Neutral, and Low objective frustration respectively.

The technique for classifying children as Under-Achievers, Normal-Achievers or Over-Achievers depends on correlating measures of achievement and intelligence, calculating a regression line and then defining a zone of "normality" on both sides of this line. Arbitrarily, $\pm .5\,\sigma_{y.x}$ (half of the standard error of estimate) was allowed to determine this normal zone. In theory, this zone should include 34 per cent of the total while the segments above and below this zone each contain 33 per cent of the total number of cases. In classifying children for this study, each child was placed in a cell whose left boundary was determined by the child's IQ (determined by the California Test of Mental Maturity); the lower boundary of this cell was determined by the child's Average Grade Level Achievement. Children in borderline cells, that is, in cells which were intersected by the lines defining the upper or lower limits of the normal zone, were classified as Normal-Achievers. Table 2 describes the actual distribution of *S*s in the Under-Achiever, Normal-Achiever, and Over-Achiever groups.

TABLE 2

NUMBER OF BOYS, NUMBER OF GIRLS, AND THE TOTAL NUMBER OF CHILDREN CLASSIFIED AS UNDER-ACHIEVERS, NORMAL-ACHIEVERS, AND OVER-ACHIEVERS

	No. of boys	% of all boys	No. of girls	% of all girls	Combined boys and girls	% of all cases
Under-achievers	38	25.2	30	19.9	68	22.5
Normal-achievers	71	47.0	76	50.3	147	48.7
Over-achievers	42	27.8	45	29.8	87	28.8
Total	151	100.0	151	100.0	302	100.0

The simple analysis of variance technique was used to discover whether the three achievement groups were significantly different from one another in prejudice, or in any of the categories of the Self-concept Inventory. In view of established relationships between satisfaction with self and prejudice, it was possible that the presence or absence of significant differences in prejudice among the three achievement groups might result from these relationships rather than from classification into groups differing in objective frustration. Therefore, whenever the achievement groups were discovered to differ significantly from one another in any of the Self-concept Inventory categories, mean differences in prejudice were re-examined, after the satisfaction with self variable had been controlled for the three groups, by means of an analysis of covariance.

As Table 3 shows, the Under-Achiever, Normal-Achiever, and Over-Achiever groups did not differ significantly from one another in prejudice either before or after significant differences in satisfaction with self were controlled. Analysis of covariance F's are reported only when the simple analysis of variance revealed significant mean differences among the achievement groups in one of the satisfaction with self categories.

It will be recalled from Table 1 that correlating Average Grade Level Achievement (intelligence not controlled) with prejudice produced a correlation coefficient which was very nearly zero. Therefore, if we accept Average Grade Level Achievement, with or without intelligence controlled, as an indicator of one kind of objective frustration, the results of this study support Allport's contention that objective frustration is negligibly related to prejudice.

D. SUMMARY

Low, but statistically significant, correlation coefficients revealed satisfaction with personality characteristics and satisfaction with social relations with peers to be correlates of prejudice in elementary age (fifth grade) children. Slighter, but statistically significant, correlation coefficients suggest that satisfaction with social relations with parents and teachers, satisfaction with mental abilities and *satisfaction* with achievement in school subjects may be related to prejudice in elementary age children. Children who were more satisfied with themselves tended to be less prejudiced than children who were less satisfied with themselves.

Satisfaction with work habits, satisfaction with physical ability and appearance, and Average Grade Level Achievement (with and without intelligence controlled) were found *not* to be related to prejudice in elementary age children.

themselves will be less prejudiced than children who are less satisfied with themselves, seems to have been fully confirmed, since all of the coefficients of correlation are negative.

Allport's hypothesis that felt frustration is positively related to prejudice has been supported. The next section examines his further contention that objective frustration is negligibly related to prejudice.

2. *Prejudice and Objective Frustration*

The third hypothesis predicts that even if prejudice and satisfaction with self (felt frustration) are found to vary together systematically, a similar relationship will not exist between prejudice and some measure of objective frustration. Children were placed in one of three groups on the basis of Average Grade Level Achievement with intelligence controlled. These groups, called Under-Achievers, Normal-Achievers, Over-Achievers, were considered to contain *S*s with High, Neutral, and Low objective frustration respectively.

The technique for classifying children as Under-Achievers, Normal-Achievers or Over-Achievers depends on correlating measures of achievement and intelligence, calculating a regression line and then defining a zone of "normality" on both sides of this line. Arbitrarily, ± .5 σ y.x. (half of the standard error of estimate) was allowed to determine this normal zone. In theory, this zone should include 34 per cent of the total while the segments above and below this zone each contain 33 per cent of the total number of cases. In classifying children for this study, each child was placed in a cell whose left boundary was determined by the child's IQ (determined by the California Test of Mental Maturity); the lower boundary of this cell was determined by the child's Average Grade Level Achievement. Children in borderline cells, that is, in cells which were intersected by the lines defining the upper or lower limits of the normal zone, were classified as Normal-Achievers. Table 2 describes the actual distribution of *S*s in the Under-Achiever, Normal-Achiever, and Over-Achiever groups.

TABLE 2
NUMBER OF BOYS, NUMBER OF GIRLS, AND THE TOTAL NUMBER OF CHILDREN CLASSIFIED AS UNDER-ACHIEVERS, NORMAL-ACHIEVERS, AND OVER-ACHIEVERS

	No. of boys	% of all boys	No. of girls	% of all girls	Combined boys and girls	% of all cases
Under-achievers	38	25.2	30	19.9	68	22.5
Normal-achievers	71	47.0	76	50.3	147	48.7
Over-achievers	42	27.8	45	29.8	87	28.8
Total	151	100.0	151	100.0	302	100.0

The simple analysis of variance technique was used to discover whether the three achievement groups were significantly different from one another in prejudice, or in any of the categories of the Self-concept Inventory. In view of established relationships between satisfaction with self and prejudice, it was possible that the presence or absence of significant differences in prejudice among the three achievement groups might result from these relationships rather than from classification into groups differing in objective frustration. Therefore, whenever the achievement groups were discovered to differ significantly from one another in any of the Self-concept Inventory categories, mean differences in prejudice were re-examined, after the satisfaction with self variable had been controlled for the three groups, by means of an analysis of covariance.

As Table 3 shows, the Under-Achiever, Normal-Achiever, and Over-Achiever groups did not differ significantly from one another in prejudice either before or after significant differences in satisfaction with self were controlled. Analysis of covariance F's are reported only when the simple analysis of variance revealed significant mean differences among the achievement groups in one of the satisfaction with self categories.

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D. SUMMARY

Low, but statistically significant, correlation coefficients revealed satisfaction with personality characteristics and satisfaction with social relations with peers to be correlates of prejudice in elementary age (fifth grade) children. Slighter, but statistically significant, correlation coefficients suggest that satisfaction with social relations with parents and teachers, satisfaction with mental abilities and *satisfaction* with achievement in school subjects may be related to prejudice in elementary age children. Children who were more satisfied with themselves tended to be less prejudiced than children who were less satisfied with themselves.

Satisfaction with work habits, satisfaction with physical ability and appearance, and Average Grade Level Achievement (with and without intelligence controlled) were found *not* to be related to prejudice in elementary age children.

The results supported Allport's hypothesis that felt frustration was closely related and objective frustration negligibly related to prejudice.

TABLE 3

Comparison of Mean Prejudice and Self-Concept Inventory Scores of Under-Achievers, Normal-Achievers, and Over-Achievers

	Under-achievers mean score	Normal-achievers mean score	Over-achievers mean score	Analysis of variance F =	Analysis of covariance F =
Prejudice	13.2	13.6	13.5	.209	
Satisfaction with physical abilities	2.4	2.2	2.0	.165	
Satisfaction with mental abilities	3.0	2.3	1.9	4.126*	.089
Satisfaction with social relations: Opposite sex	3.2	3.9	4.0	1.540	
Satisfaction with social relations: Same sex	1.7	1.3	.9	4.351*	.134
Satisfaction with social relations: Parents	1.0	1.1	1.0	.179	
Satisfaction with social relations: Teachers	1.7	1.8	1.1	2.033	
Satisfaction with work habits	3.3	2.6	2.3	4.022*	.104
Satisfaction with personality: Social virtues	1.4	1.1	1.3	.583	
Satisfaction with personality: Happy qualities	2.9	2.5	2.0	4.993**	.149
Satisfaction with school subjects	2.9	2.3	2.6	1.525	
Total self-concept inventory score	23.6	21.2	19.3	1.660	

* $P < .05$
** $P < .01$

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The Journal of Genetic Psychology, 1962, **100**, 205-213.

PERFORMANCE AFTER FAILURE AS A FUNCTION OF INTERPOLATED ACTIVITY*[1, 2]

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A. THE PROBLEM

When an *S* is made to believe that his performance on a new learning task is markedly inferior (induced failure), his performance over a series of practice trials does not reflect the full effects of his practice. This is revealed by the fact that when the initial task is resumed following some sort of interpolated activity, reminiscence is usually observed (1, 3, 4, 5). The purpose of this experiment was to compare the relative effectiveness of various interpolated activities as a means of diminishing the effects of previous failure on a perceptual-motor task.

Earlier studies point to three classes of interpolated activities that may influence this phenomenon: (*a*) *Success or failure on a different task.* McClelland and Apicella (1) found that interpolated success on a pursuit-rotor resulted in improved performance on subsequent trials with the initial task (card sorting), which had previously been subjected to failure. The possible role of continued failure on the interpolated task was not studied, however. (*b*) *Rest.* This was not properly controlled in the McClelland-Apicella study either. Sears' (5) data make it clear that this is a relevant criticism. He found that for *S*s forced to fail on a card-sorting task, rest (engaging in activities distinctly different from the experimental task and outside the experimental situation) resulted in better performance on the first trial of any practice session than had been evidenced on any previous practice trial. (*c*) *Discussion of initial task performance.* Rohrer (3) has suggested that there is still another dimension to the "therapeutic" effects of interpolated activities—whether an activity prevents or permits "rehearsal" of the prior failure experience. He, and Rohrer and Rayhill (4) asked *S*s to learn a list of nonsense syllables, but caused them to "fail" by stopping them before learning was complete. Engaging *S*s in unrelated symbolic activity facilitated reminiscence on a subsequent test session, whereas neither formal rehearsal of the task nor informal discussion of their failure did this.

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* Received in the Editorial Office on April 8, 1960.

[1] This investigation was supported by a research grant, M-817, from the National Institute of Mental Health, of the National Institutes of Health, Bethesda, Maryland.

[2] A report of this study was submitted by the first author as a master's thesis, to the Faculty of the Graduate School of the University of Missouri, July, 1957. The second author supervised the research and assisted in preparing this report.

Taken together, these studies suggest that there is an interaction between the effects of rest (certainly important, since all initial task practice was massed) and of the experience of success or additional failure during the interpolated period. This general hypothesis was tested by the present experiment.

B. Method

Six interpolated treatments were studied. The experimental groups are designated as follows: RS (rest-success), NRS (no-rest-success), RN (rest-neutral), NRN (no rest-neutral), RF (rest-failure), and NRF (no rest-failure). Rest is defined for the purposes of this study, in terms of muscular movement. Performing movements distinctly different from those required by the experimental task, or engaging in no particular movements would constitute a rest. Engaging in movements similar to those required on the experimental task, or a continuation of the experimental task itself would constitute no-rest.

C. Subjects

The subjects were 60 students taken as they came from introductory courses in psychology and geology at the University of Missouri. These were 23 women and 37 men; six were from geology and 54 from psychology. The *S*s were assigned to their groups before *E* had seen them. Group assignments were made at random but were modified to assure equal *n*s.

D. Apparatus

The card-sorting board was made from a 24-inch square piece of gray fibre board on which the four quadrants were marked off. One of the symbols of each of the four suits of a deck of cards was on each corner of this board. A clock showing seconds and 1/100 seconds was in plain view of the *S*, approximately eight feet away. Below the clock was a large, clearly labeled graph purportedly depicting the average performance of college freshmen on the card-sorting task. This graph was based on Sears' (5) data, with all means lowered by about two *SD*s. *S*s sorted a standard pack of cards.

E. Procedure

*S*s were run individually. Care was taken to prevent interruptions and outside distractions.

1. *Initial Task*

After *S* was seated at the card-sorting table, *E* said:

> This is a psychomotor intelligence test development project. We are trying to develop a new kind of intelligence test. This test measures how quickly you think and how quickly you put your thoughts into action. Now here are the specific directions for the test. Place the first card from the deck under the club symbol—thus. Always the first card under the clubs, arbitrarily. Now place the second card of the deck under the symbol which corresponds to, or is the same as, the suit of the first card—thus. Likewise, you place the third card under the symbol, on the board, which corresponds to the suit of the second card, and so on through the deck.

E then sorted through a portion of the deck to demonstrate the sorting principle.

> Remember that the card you have just put down tells you where to put the next one. Do you understand?

S was further told:

> Before you start each trial I want you to tell me how well you think you are going to do, that is, how many seconds you think it will take you to sort through the entire pack of 52 cards. After you finish each trial I want you to read your actual score from the clock which is on the wall behind me. The inside dial, with the short red hand, reads in seconds, whereas the outside dial reads in 1/100 seconds. (*S* was then given practice at reading the clock.) Now the chart which is on the wall, under the clock, shows the average performance of 20 freshmen who have taken the test already. The data, presented by the chart, were collected by another *E*, but he was using the same card-sorting test, so it will give you an idea of how well you might expect to do. Now, as you can see by the chart, the 20 freshmen sorted through the deck in about 71 seconds, on the average, on Trial 1. By the third trial they were sorting through in about 37 seconds. How well did they do on—say—the ninth trial? (If *S* was unable to answer this, further explanation of the chart was given.)

S was then asked to state a level of aspiration (hereafter referred to as LA) (for Trial 1. *S*s performing considerably below the group mean tend to set their LA well above their performance level (i.e., have large positive discrepancy scores); the artificial creation of large positive discrepancy scores has been used as a technique for frustrating *S*s (1, 5).

At the end of the first trial *S* was reminded to report his sorting time. After the time was reported (and checked by *E*) *E* made the following comment in a sarcastic manner.

> That was much worse than the average, you are going to have to improve considerably. How well do you think you will do on the next trial?

At the end of the second trial, *E* said:

> You should have sorted them that time in 46 seconds. How well do you think you will do on the third trial?

At the end of the third trial *S* was reminded that he should have finished in 37 seconds, and asked to state an LA for the fourth trial.

At the end of the fourth trial *E*, upon hearing the score reported and verifying it, said:

> That was the worst performance I have ever seen on Trial 4! What are you going to do on the fifth trial?

No comments were made after Trials 5 and 6 but *E* maintained a sour expression and indicated disappointment in *S*'s performance.

After Trials 7, 8, and 9, *E* indicated the difference between *S*'s score and the average and stated succinctly that *S* was doing very poorly.

At the end of Trial 10 *E* said, "We are not getting anywhere with this—" the rest of the remark depending on the interpolated condition that *S* was to get.

2. *Interpolated Period*

*S*s in Group RS got a ten-minute "pep talk" designed to reverse their interpretation of their performance on the first ten card-sorting trials. *E* stated that the discrepancy between *S*'s scores and the average shown on the wall chart was almost certainly due to differences in the conditions under which the two sets of data were collected, and assured *S* that most people, working under the present conditions, sorted much more slowly than he had. The fact that tension had been deliberately introduced was emphasized, and it was pointed out that no one can work at peak efficiency under these conditions, but that *S* had been affected much less than are most people. *S*s were then shown a rough penciled graph similar to the wall chart except that all trial means had been increased by 70 seconds. *E* stated that this graph (which was also fictitious) indicated the average performance of previous *S*s in the present experiment. This graph was discussed in considerable detail and the superiority of the present *S* was pointed out on several occasions. *S*s were also shown fictitious data which was said by *E* to represent the typical performance of previous *S*s. (This data indicated about the same level of performance as did the penciled graph.)

When ten minutes had elapsed since the last card-sorting trial, *E* said, "Shall we try some more card sorting?" and handed the cards to *S*.

Group NRS is comparable to McClelland and Apicella's (1) success group, but an additional control of the rest factor was incorporated. The *S*s in this group solved anagrams problems which were printed on cards, one letter to a card. The cards were sorted by *S* onto a 10-inch by 28-inch board divided into twelve equal sections placed in two rows. The anagrams were timed with a stop watch. (The anagrams were taken from Rhine's (2) "easy creature" anagrams.) The instructions to *S* were as follows:

> I have here some cards upon each of which one letter has been printed. When I give them to you they will be all mixed up so that they make no sense. However they can be rearranged so that they spell out the name of a living creature, an animal of some sort. I want you to rearrange them so that they do spell out the name of a living creature—placing them in the sections of this divided board. All of the cards must be used in every case. Do you understand?

At the end of each problem *E* informed *S* that he had done very well and read his score aloud in seconds and 1/10 seconds. (Two of the *S*s failed one anagram each.) After ten minutes, *E* said,

> I think this will be enough of these. You have done better with these anagrams than anyone who has tried them previously. Shall we try some more card-sorting trials?

*RN S*s were taken to another room where magazines and soft drinks were available. *S*s were permitted to smoke. After ten minutes *S* was called back into the experimental room and asked to try some more card sorting. These *S*s are comparable to Sears' (5) failure *S*s.

NRN *S*s went directly from the initial task to the post test with no interpolated period. This is a control group.

RF *S*s were engaged in a ten-minute conversation designed to keep their attention constantly focused upon their initial task failure. The conversation was opened by reminding *S* that he had thus far performed at a very low level indeed, and that this was surprising in view of the fact that he was a college student and that this was an intelligence test. *S*s were shown data that allegedly represented the typical performance of previous *S*s in this experiment. These data indicated a performance comparable to that depicted by the wall chart. *S* was encouraged to do most of the talking. He was asked to discuss any factors which might, in his opinion, account for his "extremely poor" performance. If conversation lagged, or strayed from the topic of *S*'s failure, *E* interjected questions and comments about

S's "extremely poor" performance. This group is similar to Rohrer's (3) "informal discussion of failure" group.

NRF *S*s were given the same instructions as NRS *S*s but were given different anagrams to solve. Anagrams given to this group were adapted from Rhine's (2) "difficult creature" anagrams; only one of the anagrams was solvable. On each trial *S* was asked to stop, gather up the cards and hand them to *E* after 1.5 minutes had elapsed. If *S* had not placed one card within thirty seconds after the start of any trial he was told to place a particular card in the first section of the board. At the end of each successive 15-second period *S* was told which card to place in the next section. This was done to assure that *S* kept moving (i.e., was not allowed to rest). This prompting was done in a manner designed to inform *S* that *E* was disgusted with his performance. At the end of ten minutes *E* told *S*:

> This is the worst performance I have ever seen on this anagrams test. We obviously are not doing any good with these. Shall we try some more card sorting?

3. *Post Test*

At the close of the interpolated period all *S*s were given five card-sorting trials identical with those given during initial training except that *E* read the times from a stop watch and did not report them to *S*, nor were any remarks concerning the performance of *S* made. *E* kept his manner quite formal and remained completely noncommittal regarding *S*'s performance. *S* was still asked to state an LA for each trial.

F. Results[3]

Table I gives the mean reminiscence scores (Trial 10 minus Trial 11 sorting times) of the groups; a 3×2 analysis of variance on these scores shows a significant rest × affect interaction mean square ($F = 6.88$, $p < .01$ for 2 & 54 *df*).

There is no basis for attributing any of the differences in reminiscence to differences in card-sorting abilities of the *S*s in the different groups. An analysis of the sorting times for Trials 1 and 2 reveals no reliable between groups effects, all *F*-ratios being less than 1.00; there was an over-all decrease in sorting times from Trial 1 to Trial 2 ($F = 32.376$, $p < .001$ for 1 and 54 *df*). Similarly, a 3×2 analysis of the scores on Trial 10 (i.e., just prior to the interpolated conditions) indicates no reliable differences among the groups.

TABLE I
MEAN REMINISCENCE SCORES
(n = 10, each group)

		Interpolated Conditions	
		Work	
Affect		Rest	No rest
Neutral	M	11.18	—0.46
	s	9.70	7.82
Success	M	6.91	14.77
	s	6.68	4.19
Failure	M	8.10	9.13
	s	6.28	13.09

An analysis of the transformed sorting times for Trials 11 through 15 ($100 \times$ reciprocal—the larger the score the more efficient the card sorting) shows a reliable difference between the grand mean for all NR *S*s ($M = 1.8970$, $s = 0.4027$) and that for R *S*s ($M = 2.0782$, $s = 0.3249$) ($F = 4.025$, $p < .05$ for 1 and 54 *df*).

The interpolated conditions produced no reliable differential effects on the LA.

G. Discussion

This study confirms the hypothesis that the work and affective conditions of the interpolated period interact in determining the amount of reminiscence following induced failure. In general, the previous work (1, 3, 4, 5) in the area is upheld, but this study enables us to state the relationships between these variables more explicitly, viz.:

(1) Under "neutral" (not specifically controlled) affect conditions, rest produces far more reminiscence than no rest. Considering only groups RN and NRN, this result is hardly novel. It is worth noting, however, that this difference still holds over all post-interpolation trials when all Rest and all No Rest groups are compared; this fact at least upholds our fairly loose definition of "no rest" in the NRS and NRF groups.

(2) Success on a task similar to the initial task (NRS) produces more reminiscence than a passive reinterpretation of *S*s' past performance while *S* is resting (RS).

(3) The work factor does not seem too important if the interpolated activity involves further failure; our RF and NRF conditions produced essentially equal reminiscence.

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[3] A 6-page table giving data for each of the subgroups has been deposited as Document number 7068 with the ADI Auxiliary Publications Project, Photoduplication Service, Library of Congress, Washington 25, D.C. A copy may be secured by citing the Document number and by remitting $1.25 for photoprints, or $1.25 for 35 mm. microfilm. Advance payment is required. Make checks or money orders payable to: Chief, Photoduplication Service, Library of Congress.

We might summarize effects (2) and (3) as follows: Success can most effectively reverse the effects of prior failure if it is associated with some specific performance; the effects of previous failure can be partially overcome about equally well either by discussion of this previous failure or by additional failure on a new, but similar task. It may seem strange to speak of further failure "overcoming" the effects of previous failure, but failure (frustration) is often regarded as a motivating condition currently. Actually, it may be equally plausible to regard the NRF and RF groups as controls for the effect of a temporary change in work conditions without a change in affect; this interpretation would only supplement, not alter, the conclusions drawn above.

The study provides no evidence that the interpolated conditions differentially affected the stated LAs for the post test. Thus as Steisel and Cohen (6) have found, interpolated success and failure did not affect the stated LA in the same way that they affected task performance itself.

H. SUMMARY

This study sought to make a more thorough evaluation than has formerly been done of the effects of different interpolated work and affective conditions on the performance of a previously frustrated task. Sixty college students were forced to fail on ten card-sorting trials. Thirty of them were then permitted to rest for ten minutes, while the others were required to continue with activities identical or similar to those of the initial task (no rest). Each of these groups was further subdivided into three groups, receiving success, further failure, or neutral (uncontrolled) affect. Finally, all *S*s were given five "neutral" card-sorting trials.

The work × affect interaction mean square based on "reminiscence scores" is reliable (.01). No rest-success produced the greatest gain in efficiency on the first post-interpolation trial, followed by rest-neutral, no rest-failure, rest-failure, rest-success and no rest-neutral in that order. More generally, success on a specific interpolated task produced the greatest reminiscence, but re-evaluation of *S*s performance on the initial task (rest-success) was superior only to a group having no change in conditions between Trials 10 and 11; further failure or "rehearsal" of previous failure had about equal effects. Thus, rest most effectively alters the influence of induced failure when there is no affect involved during the rest period; success is best applied in a situation similar to the former failure task, while interpolated failure is equally effective (or ineffective, perhaps) under both rest and no rest conditions.

This study provided no evidence that the various interpolated activities differentially affected the stated level of aspiration.

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The Journal of Genetic Psychology, 1962, **100**, 215-220.

REVERSAL LEARNING BY HORSE AND RACCOON*[1, 2]

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A. The Problem

When rats (Dufort, Guttman and Kimble, 1954) and cats (Cronholm, Warren and Hara, 1960) are tested on serial reversals of the same discrimination habit, they show a progressive reduction in the number of errors per reversal. The purpose of the present experiment was to investigate the performance of two less frequently studied species, raccoon and horse, on similar series of discrimination reversals.

B. Method

1. *Subjects*

The single raccoon studied, aged one year at the time of testing, had been hand fed during infancy and was quite tame and well adapted to the laboratory. He had previously served in an experiment on *umweg* learning in a closed field maze (Warren and Warren, 1959). During this experiment he had continuous access to water and dry dog food in his living cage and received pork kidney, a highly preferred food, as a reward for correct responses during the test sessions.

Two horses were not laboratory subjects; to emphasize this fact we refer to them by their names, Pancho and Rag Mop. They lived in and were tested at a riding stable, and throughout the experiment were ridden during the morning by students. The horses were tested in the early afternoon, approximately seven hours after their morning feeding.

2. *Apparatus*

The raccoon was tested in the Wisconsin General Test Apparatus (Harlow, 1949). A black object was always presented on the right, and a white object on the left, on a grey tray containing two food wells 12 inches apart, so that both brightness and positional cues were constant and relevant.

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* Received in the Editorial Office on April 8, 1960.

[1] This research was supported by Research Grants NSF-G3278 from the National Science Foundation, and M-1364 from the National Institute of Mental Health, U.S. Public Health Service.

[2] The authors are grateful for Kim Firestone's assistance in testing the horses.

The horses, tested in a large paddock, were released at the entrance gate and required to choose between two boxes, 40 feet from the entrance and 20 feet from one another. The box on the right was black and the one on the left white, so that brightness and spatial cues were combined in the same fashion for the horses as for the raccoon. It was impossible for humans, and presumably horses, to tell which of the boxes, 30 inches deep, contained hay until approached within one or two feet.

3. *Procedure*

On the first training trial neither stimulus was rewarded. *S* was required on subsequent trials to choose the initially non-preferred stimulus and training was continued until the criterion of 11 correct out of 12 responses, with the last eight all correct, was attained. Upon completion of the preliminary discrimination, *S* was required to select the previously incorrect stimulus. Thereafter, the two stimuli became alternately correct and incorrect as the criterion was satisfied. The animals were trained to criterion on one problem per day with minimal intervals between trials. The raccoon completed 20 reversals; circumstances beyond our control prevented training the individual horses on more than six and nine reversals. The noncorrection method was used throughout.

C. Results

The results for the raccoon are presented in Figure 1, which shows that this *S* made a striking improvement in performance over the series of reversal tasks. This animal never on subsequent reversals made as many errors as on the first reversal. Indeed, on only four occasions did he commit as many errors on reversal learning as in solving the original discrimination (Reversal 0). The average number of errors on Reversals 1 through 4 was 8.75, and on Reversals 17 through 20, 2.25.

Learning curves for the two horses are shown in Figure 2. Both animals learned the successive reversal problems very quickly; Pancho solved all the reversals more quickly than he mastered the original discrimination, and averaged fewer than two errors per reversal over the series of nine on which he was tested. Rag Mop made the same number of errors on the first reversal as on the original discrimination, and averaged two errors per problem over six reversals.

D. Discussion

The raccoon and the horses all showed a rapid reduction in the number of errors made in learning successive reversals of a positional discrimination.

Qualitatively similar results have been obtained in comparable experiments with cats (Cronholm, Warren and Hara, 1960), human imbeciles (House and Zeaman, 1959) and rats (Dufort, Guttman and Kimble, 1954). Within

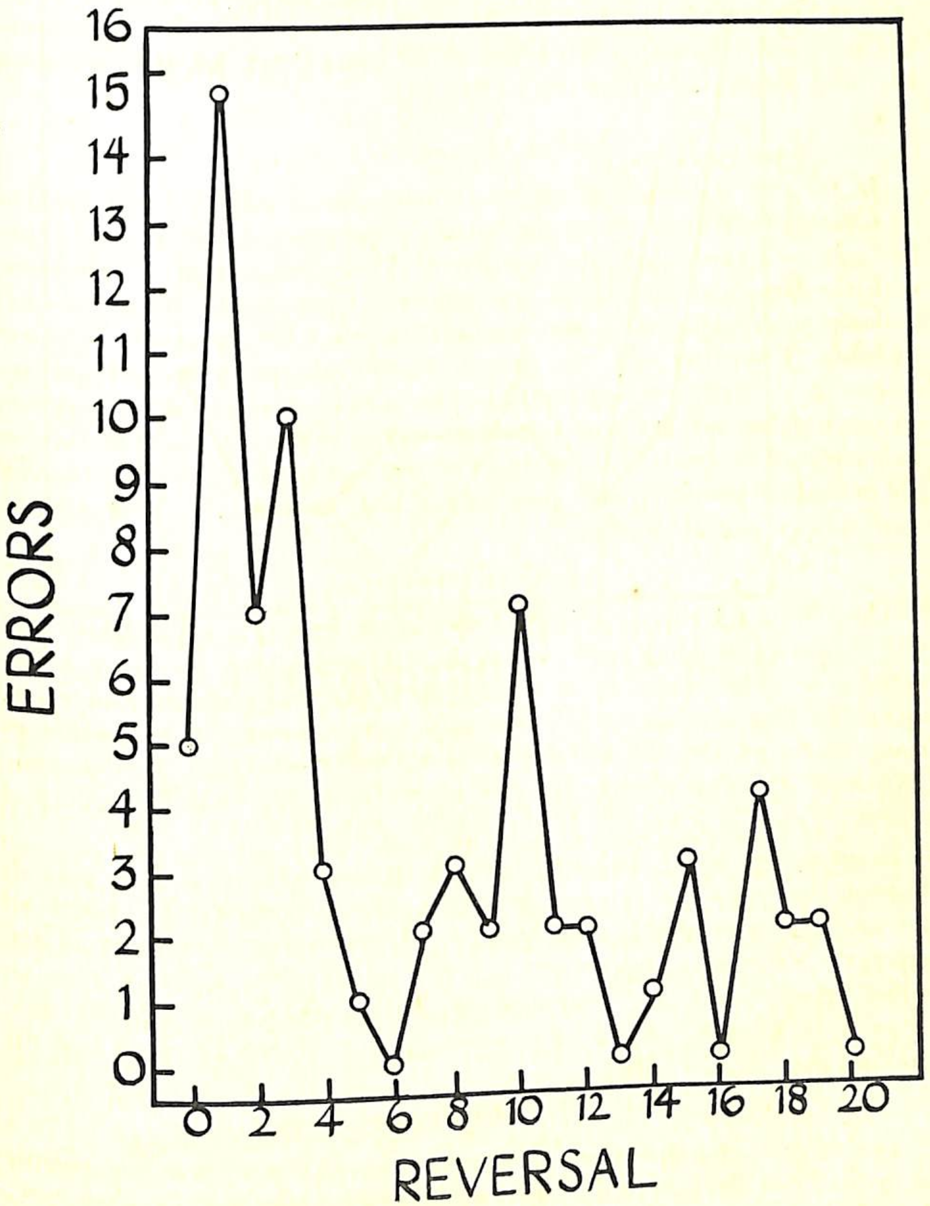

FIGURE 1
Reversal Learning by a Raccoon

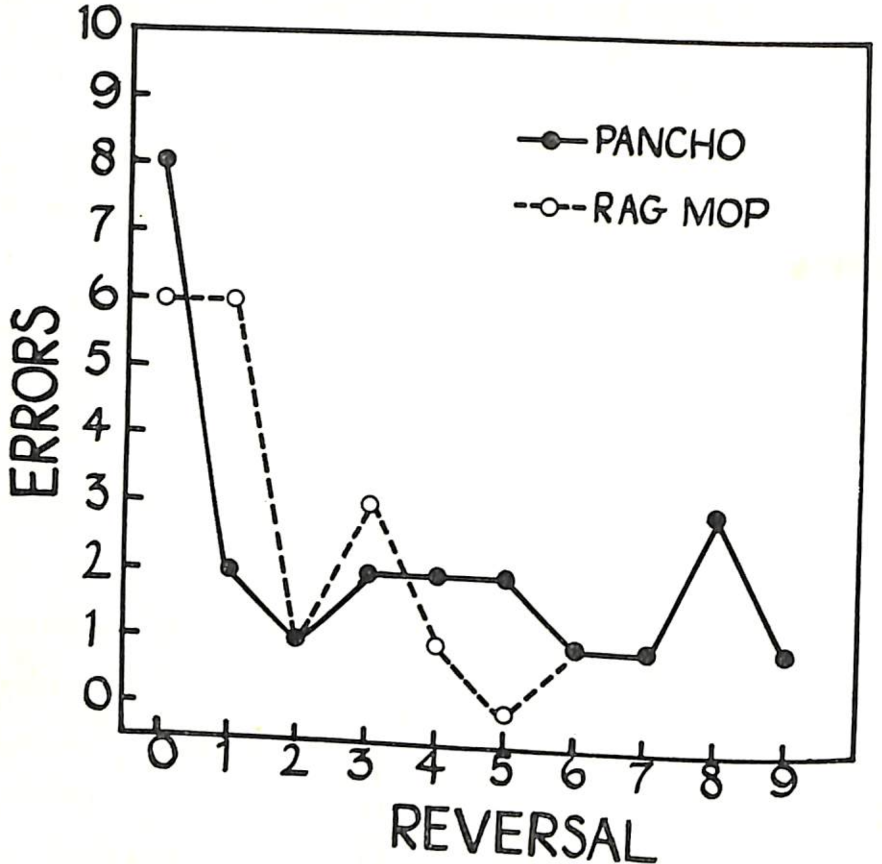

FIGURE 2
Reversal Learning by Two Horses

this series of mammals, proficiency in interreversal learning is not related to capacity for solving more complex problems. Rats and imbeciles approach the limit of one error per reversal most rapidly, cats and raccoons most slowly. Yet imbeciles (House and Zeaman, 1958) do not form learning sets for non-spatial visual discriminations, and rats (Koronakos and Arnold, 1957) form such sets far less efficiently than either cats (Warren and Baron, 1956) or raccoons (Shell and Riopelle, 1957).

The serial reversal task, however, does clearly differentiate between higher vertebrates, and fish and invertebrates. Chickens (Warren, Brookshire, Ball and Reynolds, 1960), in addition to the mammals just listed, show a marked reduction in errors on consecutive habit reversals. The results obtained from several species of fish (Adkins and Fields, 1957; Bitterman, Wodinsky and Candland, 1958; Warren, 1960), crabs (Datta, Milstein and Bitterman, 1960) and sowbugs (Thompson, 1957) have been consistently negative. In fact, in some studies a progressive *deterioration* in performance has been observed (e.g., Adkins and Fields).

The findings just discussed clearly support the supposition that major stages in the evolution of the nervous system are correlated with the emergence of new capacities for solving complex problems, rather than with increases in the rate of simple learning.

E. SUMMARY

A raccoon and two horses were tested on serial reversals of a positional discrimination. A rapid decline in the number of errors made on consecutive reversals was observed in all three animals. Improvement in the rate of interreversal learning on simple discriminations does not correlate with taxonomic status or ability to solve more complex problems within the series of mammals studied. However, all mammals tested on this task "learn to learn," but fish and invertebrates do not.

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The Journal of Genetic Psychology, 1962, **100**, 221-226.

THE DEVELOPMENT OF WALKING IN A CHILD*

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A. Purpose

The writer has had the opportunity to make extended observations on the initiation of walking in a baby girl, M.S. The purpose of this communication is to present some quantitative data on an individual case, concerning this motor function. Although this represents the motor development of only one case, data of this nature have not hitherto been available, owing to the prolonged and constant observation necessary to secure the information presented herein. And the figures are representative of a normal, apparently average child, who has now attained the age of seven. At age 13 mos., 4 days, M. stood up independently for a short time, and did this apparently without being conscious of the fact. She weighed at this time 24 pounds, was 29 inches tall. She has one brother, 17 months older; both are normal children, with rather above average I.Q. M's birth had been normal and uneventful, and she weighed then 7 pounds, 6 ounces, and was 20 inches in length.

B. Results

Between the initial act of standing alone and taking her first steps independently, there was a latent period of 25 days. On the 25th day after standing alone, she started to walk independently by standing cautiously, taking one or two steps, and then falling. She repeatedly made such attempts to walk. On the 28th day she was able to take four consecutive steps, and repeated this performance several times. On this day her response (Babinski) to firm stroking of the sole of the foot with the index finger was somewhat variable and usually consisted of a slight plantar flexion of the toes, followed by a more pronounced dorsiflexion of the toes. When partially supported by a toy carpet sweeper, using the handle as an aid to walking, she was able on the 28th day to take 12 staggering irregular steps while pushing the sweeper before her. Her vocabulary at this time consisted chiefly of the words "baby," "more," and "baw" (for "ball"). She was able also to climb one or two steps of the kitchen ladder.

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* Received in the Editorial Office on April 11, 1960.

[1] Aided in part by a grant from the National Foundation for Neuromuscular Diseases, New York, N.Y.

To represent quantitatively her progress in motor performance as a function of age, the measure adopted was the number of consecutive steps she could take without falling, at any given observation. When several observations were taken during the day, they were averaged. The result is present in the graph of Figure 1. It is evident that facility in walking developed in a non-linear mode after a latency of several weeks from the time of independent standing. At the time of the last observation shown in Figure 1 (46th day), seven teeth had erupted (four upper, and three lower incisors).

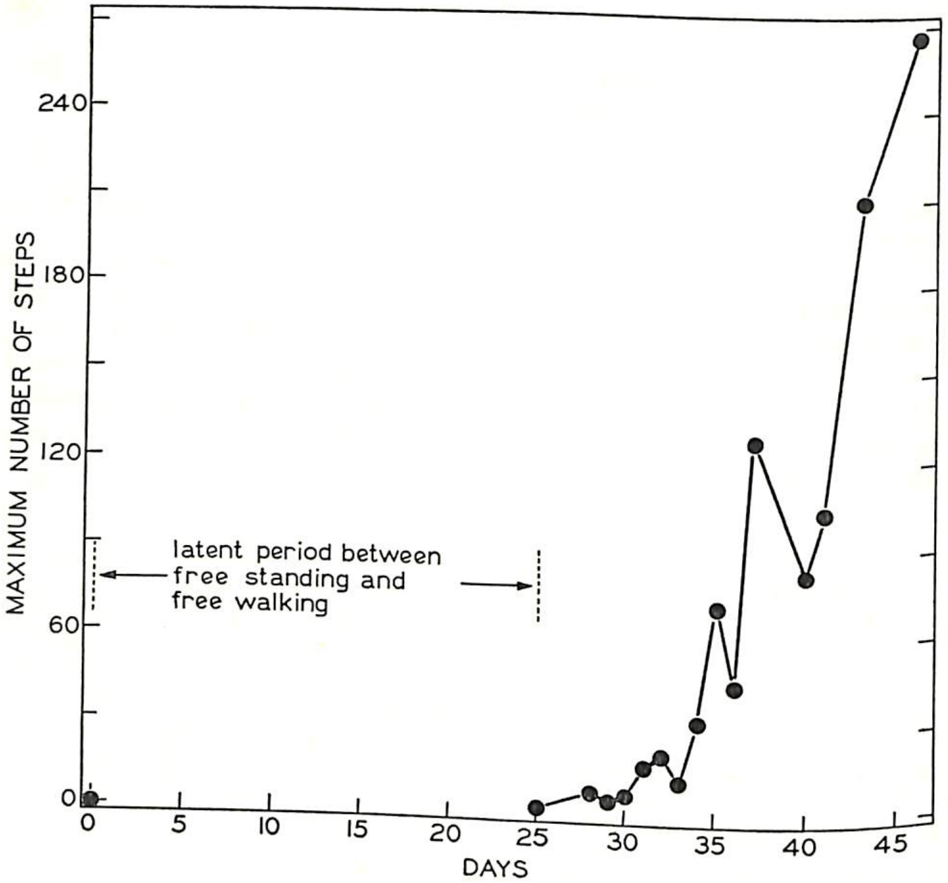

FIGURE 1
MAXIMUM NUMBER OF STEPS TAKEN BY THE INFANT, M.S., AFTER FIRST INDEPENDENT STANDING, AT TIME ZERO

The data in Figure 1 appear to be "modulated" by an approximately 4-day cycle. I am indebted to Dr. Thomas Harvey for pointing out to me that in his studies of development of rolling behaviour in infants (3) he has made analogous observations of periodicity in motor development, and that these are consistent with the wider experiences of Gesell. An infant may learn to use its hand, then lapse for a time, and use it to a greater extent. This has been noted in the development of a number of motor patterns.

By plotting the data as shown in Figure 2, it is evident that the development of walking progressed at an exponential rate. More specifically

$$N = e^{0.26t + 1.07}$$

where N represents the maximum number of consecutive steps taken, on any given day t. At the initiation of walking, t = 0.

On the 59th day (not shown in the graph) she was taken out of the house and given a field test on a large open cement surface basketball area. She walked 950 steps before stumbling once, and then resumed her walking for another 300 steps, following which, she pushed her carriage around. During the first 900 steps, she made four stops of a few seconds' duration, to rest briefly at posts. Thus, on the 59th day after first standing (34 days after first walking), she could manage 1250 steps essentially unaided.

C. DISCUSSION

Gesell and Thompson (2) state (p. 96):

> The transition from self-supported standing to free standing to independent walking is genetically a gradual one, even though performance finally manifests itself with apparent suddenness. The saltatoriness is fictitious and rests upon the assumption that the child's behaviour falls into only 2 categories—that he either walks, or walks not. It must now be clear that he approximates walking and standing by slow degrees, through incrementations and synergetic correlation of many abilities. The attainment of self-balance is the culminating factor.

In the case of M.S., be it noted, Figure 1 shows a true latent period of 25 days between the initiation of independent standing and that of independent walking.

Riese (4) has observed that the structural plan of the central nervous system of the new-born opossum corresponds approximately to that of a human embryo of about the same length. The human embryo reaches this stage at the age of 6-7 weeks, the opossum after a gestation period of 12 3/4 days. The opossum is the only mammal born without a cerebral cortex or its primordium (laminosa granularis primaria). Despite its very

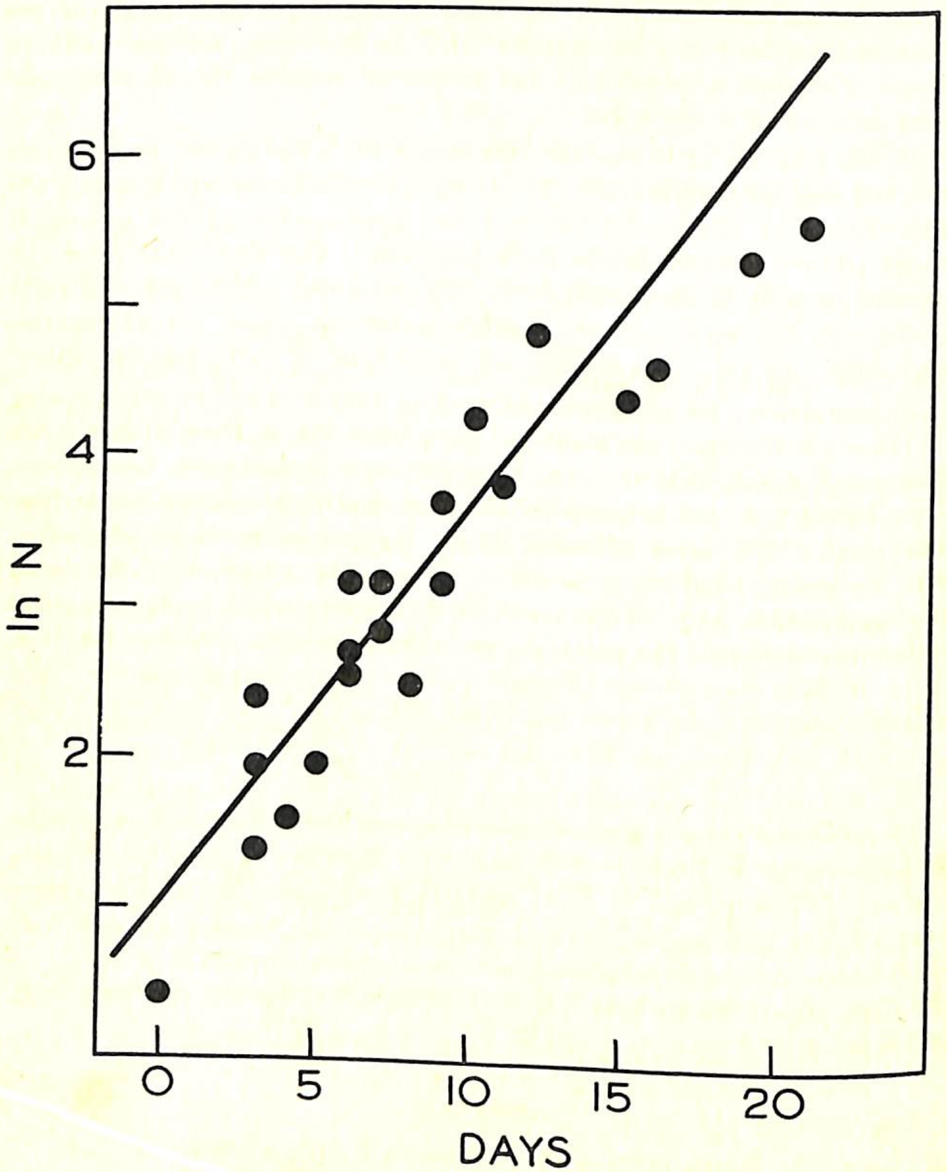

FIGURE 2
SHOWING EXPONENTIAL NATURE OF THE DEVELOPMENT OF FACILITY OF WALKING IN THE INFANT, M.S.

immature nervous system, the new-born opossum accomplishes all of the functions necessary for extrauterine life. In searching for the mother's nipple it displays a complicated and purposeful activity, though the spinal cord as a whole is immature.

By the fetal age of five months, the future adult has already acquired his full and final quota of neurons (1). In man, myelinization begins during the fifth month of intrauterine life, but the myelinization of the pyramidal tracts is not completed before the second year. The time table of motor activity given by Watson and Lowrey (6) states that at 52 weeks the child walks with one hand held, and stands momentarily alone. At 15 months, he toddles, and can creep upstairs, and at 18 months walks, seldom falling.

In summarizing the relationship between myelinization and function, Sperry (5) has observed that the addition of myelin to nerve fibers probably has little or no direct influence upon the formation of proper reflex connections. It is however an indicator of the order in which various systems become functional, the sequence of myelinization being constant in all mammals, and following roughly the order in which the tracts were developed phylogenetically. Myelinization, and the sequence in which it appears, seems to be a predetermined process capable of proceeding in the absence of function. Yet function when present stimulates and accelerates myelinization. The relation appears to be a reciprocal one.

D. SUMMARY

Observations are presented on several aspects of the development of independent motor performance in a baby girl. Between independent standing (at age 13 months and 14 days), and the first independent walking, there was a latent period of 25 days (Figure 1). Development proceeded from initial steps to continuous, essentially unaided walking, over a period of 34 days. Once initiated, facility in walking developed at an exponential, not a linear rate (Figures 1 and 2).

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The Journal of Genetic Psychology, 1962, **100**, 227-240.

AGGRESSIVENESS AND EXPANSIVENESS IN CHILDREN*[1]

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A. Introduction

There seems to be general agreement among psychoanalysts, developmental specialists, and clinical psychologists upon the relation between aggressiveness and expansiveness. The constancy of this relation is evident especially in their writing about the space filling tendency of children.

Thus, one psychoanalyst, in dealing with the influence of aggression upon life space occupancy, wrote of the "particularly close tie between aggression and motility" (2, p. 169). She noted that prolonged restraint of children's movements, as by a plaster cast, led to apathy and docility. When the motor restrictions were partially lifted, as by removal of the cast, repressed feelings broke through and found outlet in uncontrolled behavior, movement, and aggressive speech.

Similarly, developmental psychologists have recognized that "motor characteristics affect emotional expression and tensional outlets. They may even enter into the sense of self, and thereby influence interpersonal relations . . ." (4, p. 6).

The kinds of expressiveness mentioned earlier, behavior, movement, and speech, have been found to change with aging. Children four years of age, for example, were characterized by Gesell and Ilg (4) as assertive and expansive in their expressive behavior; bursting with motor activity, racing, jumping, climbing; and having a luxuriant word usage. By five years of age, however, an economy in movement and area usage was found.

Such restricted expressiveness was no longer evident by six years of age when children were depicted as being very active. By the time the seventh and eighth years were reached children became once again rather sedentary. Whereas, children nine years old presented a different picture of tensional

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* Received in the Editorial Office on April 11, 1960.

[1] Presented July, 1959, in simplified form, as the seventh of the present writer's series of educational television programs called "Psychologist's Notebook" over station WJXT of Jacksonville, Florida.

[2] My thanks are due and freely given to Robert Toal, Margaret Harrigan, John Farley, and William Tyson for their arduous assistance in objectifying movements and speech from several hundred pages of protocols and for always using humor as the integument for their hostility.

release. They were described as being "in a more or less constant state of urgency . . ." (4, p. 213), so that they not only played hard but also overdid in other activities. By the time children reached the age of 12, however, they found very different tensional outlets. For the first time spectator sports were listed as important; indeed, children at this age were said to be "self-contained . . ." (5, p. 123).

Speech seemed to follow a roughly similar pattern, from an abandoned usage at the age of four years and an "overflow in [the] mouth region" (4, p. 272) at six years of age, through well directed verbal aggression at nine years of age, to social patterns of speech acceptable to peers or families at 12 (14).

Because of their interest in verifying the congruence between behavior reflected on a projective test and that seen in the environment, clinical psychologists have expressed specifically some of the relations between expressive behavior. Statements regarding the constancy of the area factor in the macrocosm of a region and on the microcosm of a sheet of paper have resulted. In fact, the one has been used to predict the other and both have been said to be indicative of personality (16). As Gondor (6) expressed it, "Some children will not make use of the space available to them. They will withdraw into a corner . . . , or, when given a big sheet of paper, they will draw only in a corner. . . . Contrary to this, other children will . . . occupy the whole space. . . . No paper is big enough for them, and their drawings expand. . . ." "We may assume . . . that the behavior of the former expresses . . . fear; that the behavior of the latter suggests . . . aggression" (p. 10). These remarks have been used within the framework of projective testing by Hammer (10, p. 61).

Machover (15) agreed that an individual's coverage of a page in drawing was an indication of the amount of life space he took for himself. Further, she noted the importance of age and personality factors; "young children, as a rule, draw large, both out of difficulty in more refined motor coordination and the fact that restraint and reserve are minimal, while need for self-expression and expansiveness are maximal. Furthermore, the young child is generally in a small group of a family or a few friends, and can afford to take a considerable portion of the life space available" (15, p. 26). As authority outside the home shrinks and moulds children's expressive movements into a more realistic size they begin to draw in more modest proportions.

While such use of space "is, for many individuals, a stable and characteristic trait, it is, for others, quite variable. Thus, although earlier impressions were suggestive of stability of that feature, later studies with repeated drawings, revealed fluctuations, which were always consistent with the fluctuations in the individual" (15, p. 25). This is, "Hypomanic individuals . . . will spread across the page in the same way that they would stride across any canvas in life" (15, p. 26). Whereas, "small drawings indicate a feeling of smallness. . . . They are seen in . . . repressed children . . ." (15, p. 26).

Gondor (6) being especially interested in a psychotherapeutic relationship, was concerned with children's verbalizations as well as their movements in space. In two places in his text (pp. 12 and 16) he pointed out similarities between size of drawings, verbosity, and aggressiveness.

This agreement by members of three disciplines is important in view of increasing interest in the diagnostic significance of expressive movements and the prominent position drawing has in projective methodology. Perhaps because of the concordance, there have been few experimental investigations of the expressive factors of area covered in a room, on a piece of paper, and amount of talking. Only studies comparing two of these factors have been located. Such studies have been examined briefly in a report by Lebo (13) which also presented an original investigation of all three aspects. The anticipated constancy was found in the literature with one exception. The exception was the study of all three factors, walking in a playroom, volume of a human figure drawing, and number of words spoken. Not only was the anticipated consistency lacking but also, "each of the subjects was [found to be] filling space in a widely unreliable manner, in walking, talking, and drawing" (13, p. 291).

The failure to obtain the expected results among children aged four to 12 years was explained on the basis of selectivity of subjects. That is, because children were picked for the investigation so as to exclude contrasting extremes of personality, their use of space appeared to be inconsistent. Had aggressive children been compared to nonaggressive ones, or had children at an aggressive age been contrasted statistically with children at a more socialized chronological level, the anticipated results might have been forthcoming.

Because of the value of knowledge about the relation between aggressiveness and expansiveness and the dearth of controlled studies upon this topic the writer undertook the additional and more extensive research of the present paper.

B. Problem

From the foregoing considerations and for purposes of the present investigation the following hypotheses were formulated:

1. Aggressive children would use more room space, more "word space," and more drawing space than children demarcated as nonaggressive or having an intermediate amount of aggression.

Because of the close connection between aggressiveness and developmental patterns, chronological age could also be used to predict the expressive expansiveness of children.

2. As a result, children who were four years old were anticipated to require more room space and larger drawing space than children aged 6, 9, or 12 years. Those who were aged six years should use approximately the same amount of space as those nine, but children at both of these ages should have a greater extent than children 12 years old. Subjects 12 years of age were expected to require the least amount of physical space.

Word usage was another matter. Energy alone is not sufficient to assure sizeable "word space." Knowledge, experience, and socialization are equally important. In this regard, it is only necessary to remember that young children are inclined to talk readily to strangers. Older children talk less readily to such people and adults rarely talk to strangers. When adults do so talk they frequently find it necessary to excuse themselves by saying, "Pardon me, but. . . ."

3. Four year olds were assumed to be more active physically, but since they have just begun to move and talk simultaneously without the great difficulty experienced by younger children (9), it was anticipated that the massive amount of speaking would be done by six-year-old children. The next largest use of "word space" would be by the four-year-olds, followed in turn by the nine- and then the 12-year-old children.

Additional support for the third hypothesis was found in a study of the kinds of statements made by children at these different age levels (14). While children's words were not counted, the categories into which their statements could be classified, i.e., verbal expressions of aggression, self-derogation, and information giving, etc., were tallied. Six-year-old subjects used the largest variety of such categories. They were followed by children aged 4, 9, and 12 years.

C. Method

In addition to considerations of chronological age and relative amount of aggressiveness, other factors such as intelligence also had to be controlled in the subjects.

1. *Intelligence*

To be considered intellectually suitable for purposes of the present investigation, the children's IQ score, as determined by Stanford-Binet administration, could not vary more than one sigma from a mean of 100. This requirement was maintained in an effort to circumvent the influence of intelligence on the amount of talking or exploratory activities in which the children might indulge. Thus, children with very low intelligence might have said few words largely because they did not know many. Similarly, such children might have moved around looking for new stimuli because of lack of understanding or inability to concentrate upon objects close to them.

2. *Age*

Chronological suitability consisted of not varying more than four months from the ages of 4, 6, 9, and 12 years.

As speech and space usage were the dependent variables of the present study, children who could not move expressively and talk freely at the same time would not have been suitable subjects. It has been noted that, "The three-year-old finds it hard, because of his imperfect physical coordination, to do two motor things at once . . ." (9, pp. 176-177). The four-year-old can perform two such motor acts simultaneously. It is also at the approximate age of four that the child's personality has been found to acquire a definite structure, in contrast to the diffuse picture presented earlier (8). For empirical reasons such as these, younger children were not believed to be suitable as subjects.

Twelve was selected as the maximum number of years on evidence of a general decrease in the aggressive behavior of children with increasing socialization (7, 11, 18). The older the child becomes, the less generally expressive is his aggression for the more it depends upon conformity to social or peer mores. Social direction rather than self-expression becomes the keynote of aggressive impulses with increasing age.

3. *Aggressiveness*

Quantitative evaluations of aggressive behavior were secured by means of scales developed by Beller (1). They were designed for teachers to rate the classroom behavior of children on a variety of factors. They have been found to be a reliable and significant measure (17).

Scale items used to determine aggressiveness involve four statements, one of purely verbal aggression, one of mixed verbal and physical aggression, and two of physical aggression, viz.:

a. How often does the child derogate others? This means hurting other child's pride, belittling other child, contradicting other child—showing him off, e.g., "You are a bad boy," "You are a baby," "Your car is no good," etc.

b. How often does the child threaten others? Saying: "I'll hit you over the head," "I'll knock your blocks down," or by means of gestures as if he were going to do it?

c. How often does the child destroy or damage property of other child? Knocking over blocks, damaging drawing, painting, play products, or construction in the sandbox.

d. How often does the child attack other children physically? Kicking, hitting, or striking others, knocking others over, etc.

Each scale item was followed by a seven part scale line whose divisions had verbal aids in the form of expressions of relative frequency ranging from *very often* to *very rarely.*

The highest positive correlation, $r = .84$, cited by Beller (1), was found when Items *a* and *b* (verbal aggression in Beller's schema) were compared with *c* and *d* (physical aggression). However, as has been shown, Item *b* is not exclusively verbal. Positive correlations, $r = .73$ and .67, were also found between verbal aggression and dominance, and between physical aggression and dominance respectively.

Beller's dominance items, all verbal in nature, are as follows:

e. How often does child insist that his idea of how to play or what to play be accepted by the teacher, group, or playmate? Having a certain record played during music period, how to build something with blocks, e.g., ship, tunnel, etc., which story the teacher should read, which role the playmate is to assume in playing house, or train. Use an additional criterion for rating: to what extent does the child become uncooperative when his idea or suggestion is not accepted?

f. How often does child attempt to direct others? Complaining that game is not played the right way, that playmate is not doing it right, wanting to be the captain when a ship is built, ordering others what to do, e.g., "You bring cement," "You stand guard here," "You answer the telephone," "You are the baby," etc.

g. How often does the child boss others? Issue orders or suggestions and repeat them, attempt leadership, assume role of an over-ordering boss, bullying or threatening other child who fails to obey or comply.

h. How often does child dominate another child (or children)? Other child follows him blindly, taking orders from him, reporting to him what he did, asking his help, advice, etc.

Since the present study was concerned with the relation between aggressiveness and verbal as well as spatial expansion, further scale items concerned with speech would seem to be desirable. Hence, Beller's four dominance items were used also as measures of aggressiveness.

In addition to the positive correlations between these scale items, additional evidence of the relation between dominance and aggression was furnished by Griffiths (7). He had four professionally trained persons in the fields of child development and mental hygiene group 49 common behavior difficulties from lists obtained from mothers, children, and teachers. The raters classified the items into four broad psychological groups: aggressive behavior, withdrawing behavior, non-compliant behavior, and delinquent behavior. After the final grouping had been decided upon, 10 judges rated all of the items into categories. "It was arbitrarily decided that, to be placed in only one of the groups, an item should have at least 80 per cent agreement among the raters . . ." (7, p. 17). None of the aggressive items fell into two or more groups.

For purposes of the present investigation it is interesting to notice that Griffith's Item 37, "Domineering—bossy, and domineering with companions," is much like Beller's Items *e, g,* and *h* above. Griffith's Item 17, "Critical of others—finds fault with people and things" is not unlike a portion of the explanation of Beller's Item numbered *f* above, in which the child complains "that the game is not played the right way, that playmate is not doing it right. . . ." Griffith's investigation seems to have equated characteristics called dominance by Beller with the total concept of aggression.

All of the scales presented above were found to have good reliability. Four pairs of raters achieved reliability figures ranging from .78 to .97 for Beller's items of verbal aggression, and .81 to .97 for measures of physical aggressiveness. The scale items dealing with dominance yielded r's of agreement ranging from .86 to .97. Both scales included only behavioral items readily apparent from the child's interaction in the classroom. They were not intended to determine the child's attitudes towards his teacher or classmates.

In the present experiment, the children's teachers served as their raters and the children's classroom behavior was the source of their rated behavior.

Beller (1) obtained groups of children, for his investigation, by selecting those with high and low scale-scores. He defined a high score as a mean rating of five or more and low score as a mean rating of 3.5 or less. In the present experiment an intermediate group was gathered, i.e., those with scores falling beyond 3.5 but not reaching the score of 5. The intermediate group was introduced in an effort to give continuity to whatever trends might be found. For instance, if aggressive children, as hypothesized, drew large pictures and nonaggressive children drew small pictures, the intermediate children would be expected to draw pictures intermediate in size. There would be no such expectation if both aggressive and submissive children drew pictures approximately the same size.

4. *Subjects*

From those children examined intellectually and found suitable 80 were selected on the basis of age so that they were distributed chronologically in groups of 20 each for the ages of 4, 6, 9, and 12 years. So that the present investigator might avoid preconceptions about an individual child's aggressiveness, he did not examine the teachers' ratings of behavior in the classroom until the subjects' experimental protocols had been obtained. After this material had been secured the 80 children were then reclassified according to the relative amount of aggressiveness indicated by their Beller scale score.

The neatness of the chronological groups was destroyed. For, 24 children were demarcated as aggressive, 22 as intermediate in aggression, and 34 subjects were found to have scores which classified them as nonaggressive.

5. *Expressiveness*

To determine the amount of space required by each subject under standard conditions, the children were seen individually in a playroom by the present writer for fifty minutes. The furniture and types of toys remained consistent throughout the experiment. The examiner reacted to the children in a nondirective fashion. (An habitual, single exception to this practice is reported later.) That is, they were not encouraged to behave in any way or to act at all, for that matter. As each child entered the room he was told, "This is the kind of room where you can do just about anything you like." After this introduction the children assumed direction. When they spoke their feelings were reflected. If they did not speak they were not encouraged to talk, though their feelings were reflected if apparent, e.g., "You're sort of scared in here."

The use of a nondirective, or child-centered, approach seems to have obvious usefulness as a milieu for studies of expressiveness. For, this method conveys understanding of the actions rather than encouragement of performance. Behavior against such a background can be considered to be more natural and spontaneous than forced or disinterested.

This special environment was also that of the previous study (13) investigating the factors of walking, talking, and drawing. In that experiment

children were seen for three individual 50 minute sessions. The nine records (three from each session) of each child were then compared. One possibility of contamination in the earlier investigation was that children, unclassified as to aggressiveness, may have tended to explore the room and its contents in the first session and settled down to regular play by the third. Another possibility was that greater familiarity with the examiner may have made talking easier. Thus, by the third session use of floor space may have been reduced and use of "word space" increased by the conditions of the experiment. It seems unlikely, granting such circumstances, that the size of the human figure drawing could reflect a simultaneous increase in one area and decrease in another. While such a situation might have delighted a medieval theologian or scholastic it exasperates an empiric. Hence, the possibility was eliminated from the present consideration by obtaining protocols for comparison from the first play therapy period only.

As the children expressed themselves in the playroom, verbatim-style records of their speech and descriptive style notes of their actions were made in the manner suggested by Covner (3). Records were made during the play therapy sessions, both child and therapist responses were included, and the material was recorded exactly as spoken. This method was said to be the most reliable and complete when phonographic recordings could not be made. In the present investigation a tape recording would not have been sufficient since it was necessary to have a record of the child's use of space in the playroom as well as of his spoken words.

6. *Area*

To determine the amount of space traversed by each subject in the playroom, copies of a scale plan, 1/32″ = 1″, of the playroom and its furniture were made. Four judges independently read the typewritten verbatim- and descriptive-style records and were instructed to trace the child's pathway by means of a pencil on a scale drawing. Thus, a line would be drawn on the scale drawing of the playroom from the sandbox to the stage and from there to the easel, for example, for a playroom protocol noting this sequence of activities interspersed, perhaps, with dialogue and descriptions of the child's play. No other instructions were given in this regard.

Two of the judges independently read and diagrammed the play session protocols for the 4- and 9-year-old children and the remaining judges did the same for the 6- and 12-year-olds. The present writer then used a 16th of an inch ruler and measured the length of the lines drawn by each of the judges. The resulting measures were converted into ranks for the children in each age group. The ranks from a judge's 20 diagrams at one age level were correlated with the rankings obtained from the scale plan of the other judge of the same age group. Thus, the amount of agreement between their liner representation of the verbally reported behavioral observations was ascertained. Evidently the verbal reports were sufficiently accurate to produce equivalent ranks, for rhos of .99, .91, .89, and .93 were obtained respectively for children aged 4, 6, 9, and 12 years. All were significant at the .01 level of confidence. Respective standard errors for the above rank difference correlations were .004, .041, .047, and .032, allowing only minute dispersion in sample rhos for samples of this size.

7. *Drawing*

The single exception to the otherwise nondirective approach was necessary to obtain human figure drawings. All children were requested to draw a person in the playroom. Half of them were asked to draw immediately before playing and half drew immediately after each play session. The children had the opportunity to act or speak for fifty minutes, but could only draw for five. Drawing time was spaced to help reduce the possible effects of fatiguing play on one hand and anxiety producing novelty on the other on the size of the drawing.

Each drawing was measured horizontally and vertically from the center axis with a 16th of an inch ruler. This measurement seems consistent with Machover's (15) concept of size, i.e., in terms of the coverage of the whole page, vertically and horizontally. Measurements obtained from the axes were multiplied to arrive at a figure approximating the circumference. One six-year-old drew a human figure 7″ wide and 7 1/16″ tall. This figure had a circumferential value of 49.44. Only rarely was the length of both axes markedly disproportionate. An extreme example was the drawing of a child four years old which was 9 5/16 inches tall, but only 1 15/16″ wide. It received a value of 18.04 for its perimeter. Because measures were easily and directly obtained from the child's product by this method no examination for reliability was undertaken. These measures were ranked for comparison with other measure of space filling tendencies.

8. *Speaking*

The judges independently counted all the words spoken by the children in the two age groups given to them. No other instructions were given in this regard. The matter of counting hyphenated words, or clusters like *USA*, or *4:15 PM* was left to their discretion. Total word counts for individual children varied from the zero words of a four year old to the 1,314 words of a child six years of age. In those cases where the judges' total counts for a child disagreed by 10 words or more the present writer recounted to determine a correct figure. Greater accuracy than this was deemed unnecessary as the children's speech had not been phonographically recorded.

The number of words spoken by each child was ranked in order to be statistically comparable with other data.

9. *Statistic*

Previous studies (13, 14) have indicated that a normal distribution does not prevail in these kinds of data. A sensitive, distribution-free statistic was needed. Among the most sensitive of those available was the Kruskal-Wallis *H* test (12). It is believed that *H* is sensitive mainly to differences in location. Thus, it is a reasonably safe conclusion that when *H* is significant there are true differences among sample averages.

D. RESULTS

It was predicted that the expressive tendencies of more aggressive children would be reflected in their occupancy of a greater area than children with lesser amounts of aggression. This hypothesis received partial support. For the *H*'s for area covered in the playroom and for the number of words spoken by children with high aggression scores, intermediate aggression scores, and scores indicating nonaggressive personalities, were 10.14 and 17.35 respectively. The former was found to be significant at the .01 level of confidence and the latter at .005 level. In both cases, means of the ranks used to derive *H* were progressively reduced, in line with the predicted step like diminution, for decreasing amounts of aggressiveness. For the use of room space the mean ranks were 58, 46, and 31. For words spoken they were 51, 48, and 28.

The first hypothesis did not receive support insofar as the size of the human figure drawing was concerned. The resultant *H* was 1.94 which did not enable a rejection of the null hypothesis. In fact, it was found that there were 50 chances in 100 that drawings from the three groups, i.e., aggressive, intermediate, and nonaggressive, were random samples from the same population. A comparison of mean ranks for these groups 46, 38, and 38, suggested that drawing size of the intermediate and nonaggressive groups of children was indistinguishable generally.

The second hypothesis concerning age and expansive expressiveness similarly received only partial support. Once again the failure occurred in the size of the human figure drawing.

As expected, children four years of age used more area in the playroom than those of six or nine years, the latter two age groups, in turn had a larger area factor than 12-year-old children. The *H* obtained here was 16.56 which was found to be significant at better than the .005 level of confidence. Means of the ranks for the 4-, 6-, 9-, and 12-year-old children respectively were 54, 39, 45, and 25.

The area factor in drawing size, however, was again not as predicted. The children, 12 years old, drew human figures whose rank mean heights were the same, when rounded, as those of the four-year-olds. Children six years of age produced figures whose mean rank size was almost as large. The respective mean rank circumference of the human figure drawings of subjects aged 4, 6, 9, and 12 years were 45, 41, 31, and 45. The resultant *H* statistic of 4.65 was nonsignificant.

The prediction regarding word usage and age, though more complex, was supported. Six-year-old children did most of the talking, closely followed by four-year-olds. " Word space" fell off markedly in the 9th and 12th years. The mean rank of number of words spoken by children in chronological order from youngest to oldest was 50, 53, 36, 23. The *H* expressing the relationship among the 80 ranks was 20.78, significant at better than the .005 level of confidence.

E. Discussion

Despite the seemingly close agreement by members of three disciplines interested in the relation between aggression and expansion the hypotheses were only partially supported by the present investigation. The lack of support occurred in an area of importance to clinical psychologists, that of projective testing. It had been suggested by previous literature that the size (circumference) of the drawing of a person would be indicative of an individuals use of life space and vice versa. Neither the 40 subjects of the present study who drew before moving or speaking in the playroom, nor the 40 who drew afterwards had their anticipated or actual use of life space reflected in their figure size. Since the drawings were made almost at the same time occupancy of life space was measured, the discrepancy between figure size and life and word space did not seem to be consistent with possible "fluctuations in the individual." Contrary to the kind of relation suggested by Machover (15) and followed by other clinical psychologists, drawing size was not found to be the indicator of life space or expansiveness it was believed to be.

It is significant, seemingly, that while two of the aspects investigated under conditions of the present experiment received support, the third did not. As has been indicated, this third factor, size of human figure drawing, is of especial importance to clinical psychologists. As a result, special conditions were observed with regard to drawing in an effort to prevent contamination by fatigue or novelty. Despite these attempts, the hypothesized relation between size of drawing and amount of aggressiveness was not obtained. It may, then, not be entirely unlikely that the hypotheses regarding the third factor were in error. Indeed, such may well be the case.

The implications of this finding are obvious with regard to projective drawing methods. Interpretations concerning expansiveness based on the size of drawings of the human figure would seem to require the utmost caution. The present study has suggested that no significant relation exists, whether one considers aggressiveness or the factor of aggressiveness as tempered by age.

The present experiment does, however, support the general contention expressed succinctly by Murphy that "children who are active are aggressive . . ." (16, p. 598). The predicted relation between life space and aggression was found to be meaningful. It seems entirely possible that the earlier experiment (13) failed to yield any consistent results because only the factor of intelligence was clearly controlled. The continued failure to confirm the hypotheses regarding the size of the human figure drawing does not seem to be due to any such lack. Indeed, special precautions were introduced in regard to the figure drawing in an effort to insure expressiveness in the drawing. The failure, once again, would seem rather to lie in the hypotheses rather than in methodology.

F. Summary

Developmental, psychoanalytical, and clinical psychologists are in general agreement that aggressive children are more expansive, in that they require a greater amount of space, than nonaggressive children.

Hypotheses based on writings from these fields were constructed with regard to room space, number of words used, and drawing size. Factors of age and experience were also considered. Eighty children, divided chronologically into groups aged 4, 6, 9, and 12 years and categorized according to scores indicating aggressive, intermediate, and nonaggressive tendencies on a scale of aggression were used as subjects.

As hypothesized, it was found that there was relationship between use of space and words and aggression and age. However, drawing size was not found to be related, despite the fact that such a consideration has been in the armamentarium of projective psychologists.

Since all of the hypotheses were based directly upon statements found in a relatively diverse literature and those regarding room space and word usage were substantiated, it was suggested that the hypotheses, largely based on clinical approaches, regarding size of figure drawing and expansiveness were not tenable.

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The Journal of Genetic Psychology, 1962, **100**, 241-253.

ATTITUDES OF YOUNG FEMALE ADULTS TOWARD SOME AREAS OF PARENT-ADOLESCENT CONFLICT*

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A. INTRODUCTION

Many of the problems associated with the adolescent period are those involving conflicts with parents. A considerable number of these conflicts are known to be more-or-less natural results of youths' demands for independence and/or the reluctance of their elders to permit more freedom. Other conflicts at this age arise because earlier conflicts were handled poorly or were resolved in a manner unsatisfactory to one or both parties.

The types and prevalence of parent-adolescent conflicts have been studied with different objectives in mind. Primarily, the objective appears to have been the identification and classification of conflicts in various population samples. Many studies, of which a few could be said to be representative (1, 4, 7), have provided extensive data on such conflicts. Relatively fewer studies (2, 3, 5, 6, 8) have been made with the objectives of discovering family practices related to various kinds and degrees of conflict, the personal data antecedents of conflicts, or the attitudes of young adults toward conflict situations that are known to be prevalent in adolescence. None of these studies investigated the interrelationships among these areas.

B. PROBLEM

As pointed out above, many studies have identified parent-adolescent conflicts. From these studies the investigators chose 37 conflict situations which made up the core content of two separate questionnaires. These questionnaires provided the data from which the following questions were investigated:

1. Do family practices with regard to situations related to conflict vary greatly from family to family?
2. Is the amount or seriousness of conflict related to family practices regarding situations productive of conflict?
3. Is the amount or seriousness of conflict related to personal data provided by the *S*s?

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* Received in the Editorial Office on April 11, 1960.

[1] The writers wish to acknowledge the assistance of Leroy Wolins in the statistical analysis of the study.

4. Do the attitudes now held by the *S*s with regard to practices productive of conflict agree with the practices in their own families when they were adolescents?

In addition, several observations were made from the data which proved to be interesting, but not necessarily significant.

C. PROCEDURE

1. *Subjects*

One hundred and three females, all members of two classes in adolescent psychology at the Iowa State University of Science and Technology, served as subjects. They ranged in age from 19 to 30, but the majority were close to 20 years of age and only three were older than 23. The majority were juniors in the University, with the remainder being seniors. Ten were married.

2. *Data Instruments*

The *S*s were given two questionnaires which they filled out during two successive class periods. The first questionnaire dealt with attitudes toward various areas of potential conflict between adolescents and their parents. Each *S* was asked to indicate her degree of agreement or disagreement with each of 37 statements concerning the way in which a 16-year-old girl should be treated by her parents. Responses were made on a five-point scale, from "strongly agree" to "strongly disagree." An example of such a statement is: "She should be free to make her own decisions regarding appropriateness of clothing for various occasions."

The 37 statements, chosen for their frequent mention in studies of parent-adolescent relationships, covered three general areas: (*a*) Family Rules and Regulations—Twelve statements in this area covered such things as the hour to be in after a date, number of dates per week, use of the family car, home duties, etc. (*b*) Behavior Involving the Family—Eleven statements were concerned with conflict with siblings or relatives, amount of discipline used, weekly allowance, etc. (*c*) Freedom in Making Personal Choices—Fourteen statements were concerned with choosing own clothes, hair style and use of makeup, college or occupational choice, boy and girl friends, movies and T.V. programs, etc.

The second questionnaire, administered two days after the first one, contained three parts: (*a*) *S*s were asked to provide personal data concerning age, marital status, number of older and younger siblings in their family, size of home town, amount of education of father and mother, and the type of authority pattern within the family. (*b*) They were asked to indicate the practice within their own family, when they were 16 years of age, concerning each of the 37 areas which had been presented previously on the attitude questionnaire. For each item, three, four, or five alternatives were presented, and each *S* was instructed to mark the one which most closely described the practice in her own family. (*c*) For each of these 37 statements, each *S* was also asked to indicate the degree of conflict which arose over it between her and her parents when she was about 16. Degree of conflict was indicated on a three-point scale: *1* (little or no conflict), *2* (occasional conflict), or *3* (serious and/or frequent conflict).

An example of the type of statement appearing in the second questionnaire is:

When I went out in the evenings, my parents
(1) insisted upon knowing where I was going
(2) usually asked but were not demanding
(3) sometimes asked where I was going and sometimes didn't
(4) seldom if ever asked where I was going

In the analysis of the data, comparisons were made among practices in the family, amount of family conflict, personal data, and present attitudes toward adolescent behavior, since any relationships found might help to explain the present attitudes of the *S*s.

D. RESULTS

The first step in the analysis was to tabulate the responses to that part of the second questionnaire which sought to discover parental practices regarding the 37 conflict situations. Because of space limitations, the results of this part of the study are not presented here in detail. In general, they were in accord with data presented in other studies concerning treatment of adolescents by parents. Two points are of interest in this connection: (*a*) the responses within the group were fairly consistent, indicating that the background of the *S*s with regard to parental treatment of adolescents had been somewhat homogeneous; and (*b*) the family practices seem to have been relatively liberal, with few *S*s indicating severe restrictions on their behavior.

In general, conflict with parents was not very prevalent among these *S*s. A response of *3* (serious and/or frequent conflict) was made only occasionally. Those areas in which conflict most frequently occurred involved (*a*) discipline practices, (*b*) responsibilities expected of the *S*s, and (*c*) family rules and regulations.

The responses to the attitude questionnaire tended to agree with previous research and the *S*s were in general agreement among themselves. The tendency was for the *S*s to have liberal attitudes toward adolescents, yet applying restrictions in certain cases.

The major part of the study involved comparisons of the various data in order to determine, if possible, (*a*) the causes of the conflicts which occurred between the *S*s and their parents; and (*b*) the antecedents of the present attitudes of the *S*s.

1. *Factors Related to Conflict*

To determine the relationship between conflict and the personal data, those *S*s who reported a high degree of conflict with their parents were compared with those who reported little conflict. In order to do this, a "total conflict score" was obtained for each *S* by adding her scores on all items. The minimum possible score was 37 (every item marked *1*, meaning "little or no conflict"); the maximum possible score was 111 (every item marked *3*, "serious and/or frequent conflict"). These totals ranged from 37 to 63, with a mean of 45 and a standard deviation of 5.9.

Those *S*s whose scores were one sigma or more above the mean (N = 18) were compared with those whose scores were one sigma or more below the mean (N = 22). Comparisons were made with the following items: (*a*) number of younger siblings; (*b*) number of older siblings; (*c*) size of home town; (*d*) mother's education; (*e*) father's education; and (*f*) type of family authority pattern. The significance of the difference between the distributions of the two groups in each of the above cases was tested by means of the chi-square test. In each case, the differences between the groups were found not to be significant at the five per cent level.

The second approach to the problem of locating the roots of the parent-adolescent conflict was comparison of the amount of conflict reported on each item with practices of the parents on the same items. The procedure was to compare those individuals who reported some conflict on an item with those who reported little or none, to see whether the practices in the families of the two groups differed significantly. Such differences, if found, might be assumed to be related to the presence or absence of conflict in those families.

An examination of the conflict scores on various items showed that, in most cases, "little or no conflict" was the most typical response. Therefore, in order to achieve an adequate sample in the conflict group, *S*s responding either *2* or *3* ("some" or "much" conflict) were combined and these *S*s were compared with those marking *1*. Even so, for over one half of the statements, there were not enough *S*s in the conflict group to make such a comparison feasible; hence, these items were omitted from this part of the analysis. There were 13 items on which 24 or more of the *S*s had indicated some conflict in their families. These items were the basis of this analysis. On each of these 13 items, a chi-square test of significance was computed to determine whether the practices within the "no-conflict" group differed significantly from those in the "conflict" group. The results are presented in Table 1.

TABLE 1
DIFFERENCES IN FAMILY PRACTICES BETWEEN "LOW-CONFLICT" AND "HIGH-CONFLICT" GROUPS ON THIRTEEN ITEMS

Item	Df	χ^2
1	4	9.90*
2	4	6.95
5	4	67.44**
6	3	34.26**
11	2	43.81**
14	3	21.01**
17	3	25.75**
18	4	23.79**
19	3	38.21**
22	4	14.92**
23	4	15.76**
30	2	6.88
36	3	21.94**

* Significant beyond five per cent level
** Significant beyond one per cent level

The two items which failed to show significance at the five per cent level concerned: (*a*) parents knowing the *S*'s destination on a date; and (*b*) the amount of required duties at home. Item 1, significant at the five per cent level, had to do with use of the family car. It suggests that those with little conflict were allowed to use it as often as they wished, while those with some conflict were limited to car use between one and three times per week. For the ten items significant at the one per cent level, the responses indicating family practices were then studied to determine the differences between the two conflict groups. The results reported for each are trends which were inferred from this analysis. For each of these items, the family practices in each of the two groups are described below. The number of *S*s marking conflict for each item is indicated in parenthesis.

Item	*No-conflict group*	*Conflict group*
18. Type and consistency of discipline (43)	Discipline was consistent and fair, or self-discipline was mainly used.	Discipline was primarily by one parent, or it was inconsistent.

22. The hour to be in after a date (36)	The hour was set by the *S*s.	The hour was usually set by parents, but sometimes by the *S*s.
5. Use of the telephone (30)	Telephone use was not limited and was of little concern to the parents.	Telephone use was supervised but was not limited.
6. Choosing clothes to wear (29)	Parents made suggestions when asked.	Parents made unsolicited suggestions.
23. Bedtime on school nights (28)	Bedtime was chosen by *S*s and was self-enforced.	Bedtime was chosen by *S*s but was enforced by parents.
36. Number of school nights allowed out (28)	Nights out were not limited by parents.	Nights out were sometimes limited by parents.
19. Discussion of sex problems with the family (25)	Sex problems were discussed infrequently, but freely.	Sex problems were discussed infrequently and with restraint.
11. Having a room of her own at home (24)	*S*s had rooms of their own.	*S*s shared rooms with sisters.
14. Pride in parents' conduct (24)	*S*s were always proud of their parents.	*S*s were occasionally embarrassed by their parents.
17. Guidance in personal manners and habits (24)	*S*s were guided by their parents but had the final responsibility.	*S*s were guided inconsistently by their parents.

2. *Antecedents of Attitudes*

The second, and more important, purpose of the study was to determine some of the antecedents of the *S*s' attitudes toward adolescent behavior. It was hypothesized that there might be some relationship between their present attitudes toward teen-agers and the experiences which they had had in their own families as teen-agers. Therefore, the attitude scores of the *S*s on each item were related to: (*a*) the personal data information known about them; (*b*) the amount of conflict occurring over that item in their own families; and (*c*) the typical practices in their families when they were adolescents.

In order to compare attitudes and personal data, each item on the attitude questionnaire was scored for degree of rigidity expressed by the response to it. For example, if a *S* agreed strongly (by encircling a "5") with the statement, "When she goes out, parents should always know where she is going," she was considered highly rigid in attitude toward this issue. The rigidity scores for each *S* for all items were then added and the totals for the group were compared. A distribution of these totals was made and a mean and standard deviation computed. Those subjects with rigidity scores of one sigma or more above the mean (N = 15) were compared with *S*s who were one sigma or more below the mean (N = 13) on the personal data information. Chi-squares were computed to determine the degree of significance of the differences for each area of personal data. Only two aspects of the personal data were found to be related to rigidity of attitudes: (*a*) *S*s who had been reared on a farm showed greater rigidity than did the others, significant at the five per cent level; and (*b*) *S*s who had been reared in families in which the mother had more control than the father showed greater flexibility in attitude than did *S*s from families with other control patterns. This difference was also significant at the five per cent level.

In order to compare the present attitudes of the *S*s with the conflicts which they had had with their parents, a comparable procedure was followed to that used in comparing conflict and practices. Those *S*s indicating "some" or "much" conflict over an item were combined. For each item having 24 or more *S*s who indicated some degree of conflict with their parents, a chi-square test of significance was computed for the distributions of the corresponding attitude items. Twenty-two items met the criterion and were included in this analysis. On none of the items were the distributions significantly different at the five per cent level of confidence. The attitudes of the subjects therefore appeared to be unrelated to the degree of conflict in the home when they were teen-agers.

The third approach to locating antecedents of attitudes was to compare present attitudes with practices in the *S*s' families when they were adolescents. In this case, two different combinations were used in the statistical analysis. For one analysis, an attitude item must have had a minimum of 25 *S*s responding on the minority side, whether it was on the side of agreement or on the side of disagreement. If an item met this criterion, those who agreed either mildly or strongly were combined and were compared with those who disagreed, either mildly or strongly, as regards earlier family practices. On the other hand, if the number responding on the minority side was less than 25 they were ignored, and the majority side was divided into "strong" and "mild" groups for comparison. In the few cases in which most of the *S*s had indicated the same direction and strength of attitude, no analysis was made. A chi-square test was computed for each item to determine the significance of the difference between the distribution of "family practice" responses of the two groups being compared. On those items for which the difference was found to be significant, the "family practice" responses were studied to determine the actual trends for the two groups.

Thirty-two attitude items met the above criteria and were included in this analysis. Nine of these were significantly different from the "family practice" distributions. These items and their degrees of significance are shown in Table 2. Of these nine items, five involved comparisons between "agreement" and "disagreement" groups while four involved comparisons between "strong" and "mild" agreement groups.

TABLE 2

ITEMS SHOWING SIGNIFICANT DIFFERENCES IN "FAMILY PRACTICE" RESPONSES WHEN COMPARED WITH "ATTITUDES"

Item	Df	χ^2
1	4	13.17*
2	3	11.32*
20	4	10.22*
21	4	12.10*
22	4	20.04**
23	4	18.42**
27	3	14.03**
31	2	16.49**
36	3	9.26*

* Significant beyond five per cent level
** Significant beyond one per cent level

The following five attitude statements are those on which there was a significant difference in earlier family practices between those who "agreed" and those who "disagreed" with the attitude statements. The most typical family practices are given for each attitude group.

Statement	*Those agreeing*	*Those disagreeing*
1. "As a general rule, she should not have the use of the family car in the evenings."	*S*s were allowed to use it either quite freely or very little.	*S*s were allowed to use it at least once per week.
21. "Ordinarily, she should not have more than one date on any week-end."	Number of dates was not limited.	Number of dates was sometimes limited.
22. "The parents should establish a definite hour when she should be in after a date."	Parents set an hour which varied, or sometimes set no hour.	Parents sometimes set an hour, sometimes didn't.
23. "Her parents should establish a definite hour when she should be in bed on a school night."	Some parents set an hour, others didn't.	*S*s set the hour themselves.
36. "Her parents should limit the number of school nights on which she is allowed out of the house."	Some were sometimes limited, others seldom limited.	*S*s were seldom limited.

The following four attitude statements are those on which there was a significant difference in family practice between those *S*s reacting strongly and those reacting mildly in the same direction. The most typical family practices are given for each group.

Statement	*Those agreeing strongly*	*Those agreeing mildly*
2. "When she goes out, her parents should always know where she is going."	Parents insisted on knowing.	Parents generally asked, but didn't insist.
20. "She should not have dates on school nights except on very special occasions."	*S*s were allowed dates only on special occasions.	Some parents allowed only special dates, some varied, some set no limits.
27. "She should be expected to do as well as she possibly can do in school."	Parents considered academic achievement to be very important.	Parents considered academic achievement to be only somewhat important or slightly important.
31. "She should be provided with a weekly allowance."	*S*s were provided with allowance.	Some *S*s were provided with allowance, some weren't.

E. DISCUSSION

Certain cautions must be kept in mind about generalizing from the data presented in this paper. Any research involving a pencil-and-paper questionnaire is liable to error from a number of sources. For instance, some questions might be so worded as to convey improper meaning to the *S*s, lack of honesty in responses might be involved, and the possibility of recalling past experiences inaccurately is always present. There is evidence that all of these problems, along with others, may have arisen in this study. A case in point was a question which attempted to determine whether or not dissension with siblings was allowed by the parents. Apparently it was interpreted by some of the *S*s as inquiry into whether there actually was dissension with their siblings. This item was thus dropped from the analysis. There was also evidence that some of the *S*s may have tended to underestimate the amount of conflict with their parents. A sizeable number of total conflict scores were near 37, a score which could have been achieved only by marking *1* (little or no conflict) for every item.

Another limitation on generalization from these data is that the group studied was not representative of young women, nor were they typical adolescent girls when they were age 16. At the time of the study, they were juniors or seniors in college, suggesting that they were above average in intelligence and therefore probably had parents who were also above average. Nearly all *S*s were majoring in home economics, which would suggest the group probably did not vary greatly in interest and occupational goals.

For the reasons described above, the conclusions drawn from this study must necessarily be general and tentative. Nevertheless, a number of important points seem to stand out, now to be discussed.

1. *Conflict and Family Practice*

The relationships found between family practices and parent-adolescent conflict were those which generally would have been predicted. When conflict was indicated, the typical family practice was often more restrictive than in those families having little conflict. Nevertheless, it seems evident that the practices in the families of the *S*s were, in general, not very restrictive. Even in areas which produced conflict, the *S*s were not seriously limited in the activity in question. The notion that parents are quite strict with teen-age girls is not supported, although the type of group involved must be borne in mind. Many of the *S*s came from rural families, who often are assumed to be strict with their daughters. Such was apparently not the case here. Also, being from a rural family produced neither more nor less conflict than among those living in town.

Comparison of conflict and family practice suggests, also, that conflict is more likely to occur when the parents' practices are inconsistent. The majority of the items which were the source of a significant amount of conflict between parents and adolescents were those on which the "conflict" group indicated inconsistent practices on the part of the parents. Apparently, parental inconsistency is a more important determiner of conflict than is the actual degree of harshness or leniency on the part of the parents.

The failure to find specific practices which consistently produced conflicts between parents and adolescents indicates that this is not the actual source of such conflicts. It may suggest that conflicts arise instead from the more general but deeper emotional relationships between parent and child, involving such things as acceptance, rejection, and over-protection.

2. *Attitudes and Family Practices*

It is evident that the major determiner of the present attitudes of the *S*s had been the practices within their own families. This is consistent with previous knowledge concerning the role of identification and imitation in the formation of attitudes. The data show that most of the *S*s would treat a 16-year-old girl in nearly the same way as they themselves were treated at that age, regardless of whether they had had conflict with their parents over these matters at that time. It is especially to be noted that those who were treated rather strictly by their parents would be just about as strict with their own child. For example, many of those who agreed that "the parents should set an hour for the girl to be in after a date" came from families in which the parents followed such a practice. There seems to have been conflict concerning this when many of the *S*s were younger, but as young adults they were inclined to think that their parents had been right.

*S*s who came from families in which treatment by the parents was either inconsistent or rather liberal show a somewhat different pattern. It is true that they also tend to imitate their parents' practices in that they are generally more liberal in their attitudes than were the *S*s from strict homes. However, in their cases this pattern is less pronounced. There seems to be a tendency for these *S*s also to indicate a stricter attitude toward a teen-age girl than their parents displayed toward them. For example, many of those who had been allowed to use the family car rather freely when they were age 16 believed there should be stricter limits. As another example, many of the *S*s who had not been limited in the number of dates they could have on a weekend now felt that a 16-year-old girl should be limited to one date per weekend.

The reasons why many of the *S*s displayed stricter attitudes toward teen-age girls than those of parents are not directly evident. Perhaps these *S*s were still close enough to adolescence to feel that it is dangerous to allow an immature girl too much freedom. Perhaps it is tied up with complex family interaction, such as a girl feeling that she received insufficient guidance, and perhaps love, from her family. Regardless of the reason, many of the *S*s in this study would be more strict with a teen-age daughter than their parents had been with them. Very few of the *S*s would be less strict.

The data, therefore, indicate that the attitudes within this group of young women were generally quite similar to those of their parents, and in some cases even less liberal. This appears to be contrary to the common notion that the younger generation is more liberal in its attitudes than is the previous generation. It is possible that this discrepancy is due to the fact that the attitudes involved in this study concern personal behaviors which have rather recent relevance, rather than general attitudes concerning more abstract concepts.

A possible interpretation of the data is that a developmental pattern is taking place. The individual is reared throughout childhood and adolescence according to certain practices of the parents based on attitudes which they hold. During adolescence, the wishes of the teen-age girl may be thwarted by the practices of her parents, and conflict results. But this conflict apparently has little effect on her long-term attitudes. Later, when the girl has matured, she has incorporated the attitudes of her parents into her own behavior pattern and tends to raise her own children along these same lines, setting the cycle in motion again, which probably results in furthur parent-adolescent conflict in the next generation. Although this is a broad generalization, much of this conception does seem to be supported from the evidence submitted here. Further studies could be made to test this hypothesis more thoroughly.

F. SUMMARY

One hundred and three college women were administered two questionnaires on two separate days. The first asked for attitudes toward 37 problems regarding parental control of an adolescent girl. The second asked for information concerning personal data, practices in their own home in the same 37 areas, and the amount of conflict occurring between them and their parents in each of these areas when the *S*s were adolescents.

It was found that the more severe and inconsistent parental practices produced the most conflict, although in general the treatment had not been greatly restrictive. The amount of conflict in the home was unrelated to any of the personal data. Degree of rigidity of attitudes toward parental treatment of an adolescent was found to be positively related to rural background and negatively related to a maternally-dominated authority pattern in the family. Attitudes were found to be unrelated to the degree of conflict experienced in the home in any of the areas. A high degree of similarity was found between parental practices in the family and present attitudes toward parental treatment of an adolescent. There was a tendency for those *S*s who had been reared with less control to be more strict in their attitude, while those who had been reared with more control maintained a strict attitude.

It was hypothesized on the basis of the data that, although conflicts between parents and adolescents frequently arise, the young people tend to adopt the attitudes of their parents toward the treatment of adolescents as they themselves become adults.

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GROWTH AND DEVELOPMENT XI. DESCRIPTIVE ANALYSIS OF THE BACKGROUNDS OF 76 NEGRO CHILDREN WHOSE SCORES ARE ABOVE OR BELOW AVERAGE ON THE MERRILL-PALMER SCALE OF MENTAL TESTS AT THREE YEARS OF AGE*[1]

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A. The Problem

The psychological development of infants and young children, as measured by test performance, has been scientifically explored from almost every conceivable viewpoint. Investigators have studied the reliability and validity of specific tests, and of juvenile testing in general; factors associated with test performance have been evaluated; and age-level norms have been established. Escalona and Rapaport (5) state that, ". . . psychological testing of children meets a variety of needs arising in medical, psychiatric or educational practice. By means of an analysis of the different degrees of retardation and acceleration of development, and of the specific nature of atypical forms of mental functioning, testing may help to differentiate between the manifestations of congenital mental deficiency, of specific disabilities, and of various types of maladjustment." Test results are used currently in a variety of situations to make far-reaching decisions about a child's capacities and adjustment.

Racial background is one of the factors which is almost uniformly considered to be related to test performance. Bakwin *et al.* (2) state that, "On practically all tests Negroes are inferior to white children as a whole." Yet the tests by which Negro children are evaluated are standardized, almost without exception, on white children; and it has been pointed out that in order for test results to be reliable and valid, the subject ". . . must be representative of the populations used originally in standardizing the test in regard to age, sex, eucational level, and cultural background"(2).

This investigation was undertaken to analyze descriptively some of the background characteristics of a group of three-year-old Negro children whose

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* Received in the Editorial Office on April 25, 1960.

[1] This investigation was supported by a research grant [No. RG-3761 (CE)] from the National Institutes of Health, Public Health Services.

scores on the Merrill-Palmer Scale of Mental Tests indicate above or below average performance. Another report will discuss intra-test performance among the same group.

Age three was chosen for two major reasons:

1. There is general agreement among persons in the field of infant testing (see, for example, Layman (7) and Baer (1)) that developmental status during the early part of life is not very highly associated with measurable intelligence in later years. Further, Baer (1) states that, "After the age of three years, mental growth becomes relatively stable so that it is possible to predict a child's capacities for the school years."
2. The third birthday marked the first exposure of the children studied to the Merrill-Palmer test, which eliminated any possibility of practice effects, although the Gesell Developmental Schedules had previously been administered to all of the subjects.

Factors chosen for consideration include those attributes in family and home background which might be expected to bear some relation to developmental progress, for which data are available, and are as follows:

Characteristics of the Child

Sex
Birth Weight
Height and Weight at 36 months

Family Characteristics

Socio-Economic Status
Education of Parents
Employment Status of Mother
Number of Siblings
Marital Status of Parents
Occupation of Father

B. METHODS AND MATERIALS

Data for this study are drawn from a larger longitudinal study of factors influencing the growth and development of Negro infants and children from birth through five years of age (4). As part of the major study, the participating children are given developmental tests at 6-month intervals, after 24 months of age. The children included in this report represent that portion of the total group who: (*a*) reported for a 36-months evaluation between December, 1956, and September, 1959; and (*b*) whose corresponding scores on the Merrill-Palmer Scale of Mental Tests are considered superior or inferior according to test norms. All children were in good physical condition at the time of the test.

Measurement and/or evaluation of the majority of the background characteristics being considered has already been explained in previous publications in this series. It was, however, necessary to obtain an up-to-date count

of the number of children in the family. This was obtained by asking the parent when the child was brought in for the 36-months evaluation.

1. *Test Administration*

All tests were administered in one of the psychological testing rooms of the Department of Pediatrics of Hubbard Hospital, by one of two persons professionally trained in the administration of psychological tests. In most instances, only the examiner and the child were present in the testing room. On rare occasions the presence of the person who accompanied the child was permitted, when necessary to obtain cooperation. No coaching was allowed. All tests were given within one month of the third birthday, with the scoring adjusted to the exact chronological age.

2. *Test Evaluation*

Standards for delineating children whose performances are considered superior or inferior are based on the percentile classifications used by Stutsman (8). Accordingly, the following divisions were used:

Percentile rank	*Classification*
1-4	Very inferior
5-19	Inferior
20-79	Average
80-94	Superior
95-99	Very superior

These percentile classifications are derived from score values resulting from the test, and are used for evaluating performance on the Merrill-Palmer as Intelligence Quotients are used for other tests.

C. RESULTS

There were 209 Merrill-Palmer tests administered and scored at the three-year level between December, 1956, and September, 1959. Of this total, 76 (36.4 per cent) received percentile scores of 1-19 or 80-99. The specific breakdown for each of the four classifications with which we are concerned, is shown in Table 1.

There is an overwhelming preponderance of children in the "Inferior" category (76.3 per cent). Thus this group represents more than 3/4 of those with superior and inferior scores, and equals 27.8 per cent of the total sample. Conversely, there are far fewer children in the superior range than would normally be expected.

TABLE 1
PERCENTILE DISTRIBUTION OF 209 NEGRO CHILDREN ON THE MERRILL-PALMER SCALE OF MENTAL TESTS AT AGE THREE

Percentile	Total cases Number	Total cases Per cent	Extreme groups Number	Extreme groups Per cent
95-99	5	2.4	5	6.6
80-94	5	2.4	5	6.6
20-79	133	63.6	—	—
5-19	58	27.8	58	76.3
1-4	8	3.8	8	10.5
Total	209	100.0	76	100.0

D. CHARACTERISTICS OF THE CHILD

1. *Sex*

Beth Wellman (9), in a study of the intelligence of preschool children as measured by the Merrill-Palmer test, found that girls tended to receive higher scores than boys. No such clarity of results is apparent here. Table 2 presents the numerical distribution of the extreme groups by sex.

TABLE 2
DISTRIBUTION OF 76 NEGRO CHILDREN WHOSE PERFORMANCE WAS ABOVE OR BELOW AVERAGE ON THE MERRILL-PALMER SCALE OF MENTAL TESTS AT 36 MONTHS, BY SEX

Test group	Sex of child Male	Sex of child Female	Total
Very superior	1	4	5
Superior	3	2	5
Inferior	34	24	58
Very inferior	4	4	8
Total	42	34	76

When the groups are combined into "Superior" and "Inferior," there are proportionately more girls in the superior range and more boys in the inferior range, but the differences are slight.

2. *Birth Weight*

It has long been recognized that the development of premature infants is slower than that of full-term infants, but the difference in developmental rates is not generally expected to persist after the first year of life (2). In the present study, children who were premature at birth were found in all categories, except the "Superior" group. The only boy in the "Very Superior" group was premature at birth. Among the "Inferior" and the

TABLE 3
COMPARATIVE STATISTICS ON HEIGHT AND WEIGHT AT 36 MONTHS, BY MERRILL-PALMER TEST GROUP AND SEX OF CHILD

Height and weight at 36 months	Merrill-Palmer test group Male children Very inferior	Inferior	Superior	Very superior	Female children Very inferior	Inferior	Superior	Very superior
Height								
(No.) (Cm.)	4	34	3	1	4	23	2	3
Mean	92.6	94.8	96.4	93.0	93.4	94.1	93.5	97.9
SD	2.6	3.6	0.9	—	4.0	3.7	0.5	2.1
Weight								
(No.) (Lbs.)	4	34	3	1	4	24	2	4
Mean	30.0	31.1	32.9	30.3	31.9	30.0	31.9	32.0
SD	1.6	3.4	1.4	—	2.7	2.9	1.9	2.9

"Very Inferior," there were, respectively, 10 and two children who were born prematurely.

3. *Physical Measurements at 36 Months*

There was very little difference in the mean height and weight of the 76 children being studied, at 36 months, according to Merrill-Palmer test group. (See Table 3.)

Katz (6) found relationships between I.Q. and height and weight for girls during the period from three to five years, but not for boys. He stated that this variation in results could not be accounted for ". . . on the basis of differential selection of the sex groups, greater variability of the girls, or differences in the relative maturity of the two sexes." In the present study, differences in mean height and weight among the four groups are very slight, although there was a progressive increase in average height and weight among the boys from "Very Inferior" to "Superior"; and it has already been pointed out that the only boy in the "Very Superior" group was premature at birth, which may explain his smaller weight and stature.

E. FAMILY CHARACTERISTICS

1. *Socio-Economic Status*

The Socio-Economic Index used here divides study families into four broad groups from I (Low) to IV (High). Only the 58 children whose scores are rated "Inferior" cover the entire range. For both the "Superior" and "Very Superior" children, the socio-economic backgrounds ranged only from Groups II to IV, and for those children rated "Very Inferior," the highest socio-economic score fell into Group III. The small number of cases does not lend itself to statistical analysis, so that this report cannot be considered conclusive. It does, however, suggest that socio-economic differences *within* the Negro group may have some relation to test performance. Table 4 presents the composition of the four test groups by socio-economic group.

TABLE 4
NUMERICAL DISTRIBUTION OF SOCIO-ECONOMIC STATUS OF CHILDREN WHOSE PERFORMANCES WERE ABOVE OR BELOW AVERAGE ON THE MERRILL-PALMER SCALE OF MENTAL TESTS AT AGE THREE

Socio-economic group	Merrill-Palmer test group			
	Very inferior	Inferior	Superior	Very superior
IV (High)	—	2	1	2
III	3	17	2	1
II	4	29	2	2
I (Low)	1	10	—	—
Total	8	58	5	5

TABLE 5
COMPARATIVE STATISTICS ON EDUCATION OF PARENTS, BY MERRILL-PALMER TEST GROUP OF CHILDREN AT AGE THREE

Education of parent (highest grade completed)	Merrill-Palmer test group							
	Very inferior		Inferior		Superior		Very superior	
	Mother	Father	Mother	Father	Mother	Father	Mother	Father
Range	6-12	5-14	0-16	5-16	10-16	8-16	8-16	8-16
Mean	9.1	8.2	9.4	9.7	12.0	12.0	12.0	10.0
SD	2.4	3.2	2.9	2.9	3.1	3.6	5.6	7.4
Median	9.0	7.5	10.1	10.3	13.0	13.0	14.0	16.0
Number	8	6	58	45	5	5	5	5

2. *Education of Parents*

Among the children whose performance was rated "Very Inferior," no parent had completed college, and half of them had not completed eighth grade. Figures summarizing education of the parents are shown in Table 5.

A clear division exists between average education of parents whose children are in the below average range and those whose children are rated above average. Median education for fathers of the "Very Superior" children was 16 years (college graduate).

Variance analysis (using a 20 per cent sample of the "Inferior" group) indicates that there is some association between: (*a*) education of the mother and test performance of the child at 36 months; and (*b*) combined education of parents and child's performance; but father's education alone had no significant relation to the factor being considered.

3. *Employment Status of Mother*

Theoretically, the presence or absence of the mother in the home might be expected to have some influence on the development of the preschool child. The direction and nature of the influence would, however, vary depending on the type of arrangements made for the child's care. This information was not available for the present study, so that in the case of mothers who work, it is not known whether or not their children received nursery care or remained in the home. In any event, it was found that proportionately fewer of the mothers of the "Very Inferior" children were habitually employed (three out of eight), while proportionately more of the mothers of "Inferior" children (58.6 per cent) held jobs. For mothers of children in each above average group, two out of five had full-time jobs. Thus no clear relation is seen between mother's employment status and development of the child at age three.

4. *Number of Siblings*

Table 6 presents comparative figures on the number of siblings in the families of the children in the four test groups.[2]

Sibling influence on development could conceivably be exerted in either direction. It might be constructed to mean that a child would perhaps develop faster in the presence of older siblings, or might, on the other hand, retrogress in the presence of younger siblings. It would also be expected that the larger the number of siblings, the less time there would be to devote to each child, thereby either promoting independent development or retarding development as sponsored by parents. In this study, none of the children in the above average groups were "only" children, although there were relatively minor differences in the average number of siblings among the four groups. Detailed examination suggests, however, that there is a distinct trend for the number of siblings to be less among the above average children. Figures presented in Table 6 are skewed considerably for the "Very Superior" children by the presence of one child with seven siblings, while one had three siblings, and the remaining three each had only one sister or brother.

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[2] This information was not available for all of the children.

TABLE 6
COMPARATIVE STATISTICS ON NUMBER OF SIBLINGS, BY MERRILL-PALMER TEST GROUP

Number of siblings	Merrill-Palmer test group			
	Very inferior	Inferior	Superior	Very superior
Range	0-5	0-6	1-3	1-7
Mean	2.3	2.5	1.6	2.6
SD	1.4	2.2	0.8	2.3
Median	1.0	2.8	1.0	1.0
Number	6	39	5	5

5. *Marital Status of Parents*

The parents of all children in the superior range were legally married, while one parent of a "Very Inferior" child was unmarried. Seventy-nine and three-tenths per cent of the parents of children rated "Inferior" were married. In all cases where parents were unmarried, the children had been born out of wedlock, as opposed to marriages disrupted by divorce, death or separation.

6. *Occupation of Father*

The range of father's occupations among the study group was fairly wide, with one exception. Using an adaptation of the occupational classification developed by the Bureau of the Census,[3] no father of a child who was rated "Very Inferior" (where this information was available) was employed above the "Semi-skilled" capacity. Among the fathers of the "Very Superior" children, in contrast, two fathers were members of professions, while two were unskilled workers, and the remaining one was a student in a professional school. Variance analysis failed to reveal any significant association between occupation of the father and development of the child.

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[3] See Appendix.

F. SUMMARY AND CONCLUSIONS

This study was proposed to analyze descriptively some of the background characteristics of 76 Negro children who exhibited above or below average performance on the Merrill-Palmer Scale of Mental Tests at 36 months of age. The small number of cases precludes the possibility of drawing concrete conclusions, but several trends were apparent.

There was little indication that physical characteristics of the child were related to this development at age three. On the other hand, certain family characteristics which were studied did suggest some association with test performance, notably socio-economic status, education of parents, parents' marital status, and number of siblings. For the most part, these factors have long been recognized as affecting test performance of white children (3); but when speaking of the performance of Negro children, there has been a tendency to speak in terms of the group as a whole, disregarding the possibility of intra-group variations similar to those which exist among white children. Results of this study would suggest that the performance of Negro children at age three is subject to the same environmental factors which affect the performance of white children. There is, of course, no contention that environmental background alone can determine any child's development, as is evident by the heterogeneity in the backgrounds of children whose performances were in the superior range. Much of the impetus for development undoubtedly comes from factors which cannot be quantified, in addition to native endowment.

Several factors which may be strongly related to test performance were not considered here because of the unavailability of data. The extent of nursery school attendance, in particular, would have been valuable. Nevertheless, the differences which were apparent in the backgrounds of the four groups of children lend credence to the postulation that racial origin alone is not enough to allow valid generalizations about children's test performances. Since such performances cover a wide range of intra-group variability and are accompanied by more or less corresponding variations in background, any reference to differences based exclusively upon race probably should not receive more than minimum consideration.

APPENDIX

CLASSIFICATION USED IN RATING PARENTS' OCCUPATIONS

Classification number*	Classification
0	Unskilled workers (except farm)
1	Farm laborer or farm foreman
2	Domestic service workers
3	Other service workers
4	Protective service workers
5	Semi-skilled workers
6	Skilled workers
7	Clerical workers
8	Proprietary (officials and managers, excluding farm)
9	Professionals and semi-professionals

* This number was used in socio-economic scoring.

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The Journal of Genetic Psychology, 1962, **100**, 267-274.

THE RELATIONSHIP BETWEEN PHARMACOLOGICALLY MODIFIED OPERANT RESPONSE RATE AND HEART RATE[*] [1]

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A. Purpose

This study was designed to explore the relationship between heart rate and the rate of bar pressing for food reward under 21 hours of food deprivation under the conditions of no injection or intraperitoneal injections of epinephrine, chlorpromazine and normal saline.

Previous research in this laboratory (3) has indicated that the administration of several dosages of *either* epinephrine or reserpine reduced the rate at which rats acquired an avoidance response. In addition, the findings of that previous study indicated that the magnitude of the effect of epinephrine and reserpine was roughly proportional to the dosage. The data obtained at that time were interpreted as support for the notion that behavioral efficiency would be reduced if physiological activity (specifically, autonomically mediated activity) were significantly increased or decreased from some approximately "optimal" level. The untested assumption made at that time was that epinephrine and reserpine do in fact produce opposite physiological effects in the rat.

Subsequently, in unpublished studies in this laboratory, dosages of epinephrine and chlorpromazine which are *behaviorally equivalent* in their effect on Skinner box bar pressing behavior have been determined. The data obtained to date indicate that .4 mg/kg of epinephrine and 5 mg/kg of chlorpromazine are behaviorally equivalent, in that those dosages result in equal decrements in bar pressing behavior in rats, and further, the rate at which injected animals recover their "normal" rate of bar pressing is insignificantly different for at least 2 hours post injection.

In his recent review of the concept of "activation," Malmo (2) has reviewed a number of reports which provide evidence for the contention that an inverted U shaped curve can best describe the relationship between level of physiological "activation" and behavioral efficiency. In Malmo's review it can be noted that various investigators have employed diverse measures of the level of activation and several different measures of behavioral efficiency. For the purpose of the present study, heart rate was taken as the measure of activation and the measure of the behavioral efficiency was the rate of emission of a well learned operant response.

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[*] Received in the Editorial Office on April 26, 1960.

[1] This study was supported by USPHS grant MY-2755 (C1) to Drs. G. A. Ulett and J. A. Stern, Washington University School of Medicine.

B. METHOD

1. *Subjects*

Ten male Sprague-Dawley albino rats were subjects (*S*s) in this study. *S*s were 90 days old at the beginning of their training in the Skinner boxes. From the 85th day of age until the end of the study, *S*s were maintained on a 21-hour food deprivation schedule. All animals were housed individually with water available at all times.

2. *Apparatus*

a. Skinner Boxes: Two Skinner boxes were used and *S*s were run alternately in Boxes I and II.

b. Heart Rate: Heart rates were recorded on a standard Gilson electroencephalograph from stainless steel wire loops passed through the skin of the *S*'s back, one at the base of the neck, the other just over the rear legs.

3. *Procedure*

S's were trained to obtain food in the Skinner box while under 21 hours of food deprivation. This preliminary training consisted of daily five-minute trials in the boxes and continued until the five-minute response rate failed to increase for four consecutive days. The experiment proper then began. Each *S* was placed in the Skinner box for a five-minute period at 2, 3 and 4 PM daily for four days. Response rate during each of the three daily runs was tabulated.

On each of the next three consecutive days *S*s were administered intraperitoneal injections of .1 cc normal saline 15 minutes before their 2 PM run. Response rate was noted for the 2, 3 and 4 PM runs.

Three days later each *S* received an intraperitoneal injection of chlorpromazine equal to 5 mg/kg of body weight 15 minutes before its 2 PM run. Response rates for each five-minute run were again noted at 2, 3 and 4 PM.

Nine days later each *S* was given an intraperitoneal injection of epinephrine equivalent to .4 mg/kg of body weight, again 15 minutes before the 2 PM run. Response rates were tabulated for the five-minute runs at 2, 3 and 4 PM.

On days between injections *S*s were given at least one five-minute run in the Skinner boxes.

Three days after this first phase of the study was completed, two stainless steel wire loops were placed through the skin of the back on each *S* as described above. Heart rate recordings were obtained from each *S* in cages identical to the living cage. *S*s were adapted to the recording procedure for two weeks before actual heart rate recording was undertaken.

Heart rates were then recorded from each *S* on two consecutive days at 2, 3 and 4 PM. Prior to recordings on these two days *S*s had not been injected.

The following day each animal was injected with chlorpromazine equal to 5 mg/kg of body weight. After three days *S*s were given .1 cc of normal saline and two days later received epinephrine equivalent to .4 mg/kg of body weight. Heart rates were recorded on all injection days at 2, 3 and 4 PM, and the first record was taken approximately 15 minutes after injection. All injections were intraperitoneal and were between .1 cc and .2 cc in volume.

4. *Results*

a. Bar Pressing. The mean bar pressing rate under the various conditions at 2, 3 and 4 PM are presented in Figure 1.

The response rates under the no-injection and saline conditions are not significantly different from each other, nor are the rates under chlorpromazine and epinephrine significantly different from each other at 2, 3 or 4 PM. This lack of a significant difference between the response rate under epinephrine and chlorpromazine supports the choice of the drug dosages as behavioral equivalents, at least in the Skinner box situation.

The response rates observed following epinephrine and chlorpromazine are significantly lower than the response rate following saline injection at each of the 2, 3 and 4 PM runs. Thus, the effects of the drugs used persist to a significant extent for at least two hours after administration. The probability values for the observed differences are presented in Table 1.

TABLE 1

P VALUES FOR THE DIFFERENCES BETWEEN RESPONSE RATES UNDER FOUR CONDITIONS AT 2, 3 AND 4 PM RUNS IN THE SKINNER BOXES

	Epinephrine	Chlorpromazine	No injection
Saline	2 PM $<$ .01 3 PM $<$ .01 4 PM $<$ .01	2 PM $<$ .01 3 PM $<$ .01 4 PM $<$ .01	2 PM $>$ .30 3 PM $>$ .10 4 PM $>$ .70
Epinephrine		2 PM $>$ .70 3 PM $>$ .10 4 PM $>$ .30	

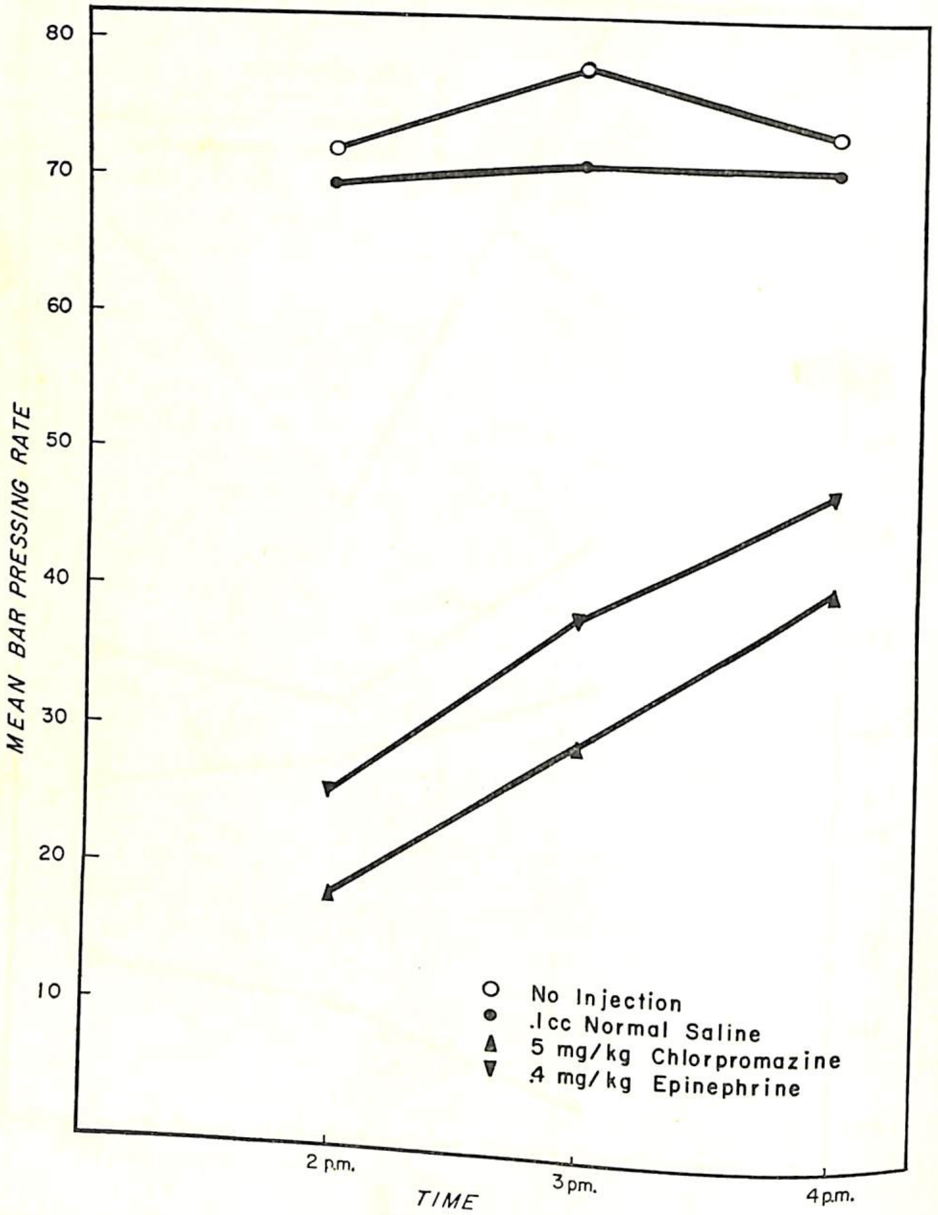

FIGURE 1
MEAN BAR PRESSING RATES DURING THREE DAILY RUNS UNDER FOUR CONDITIONS

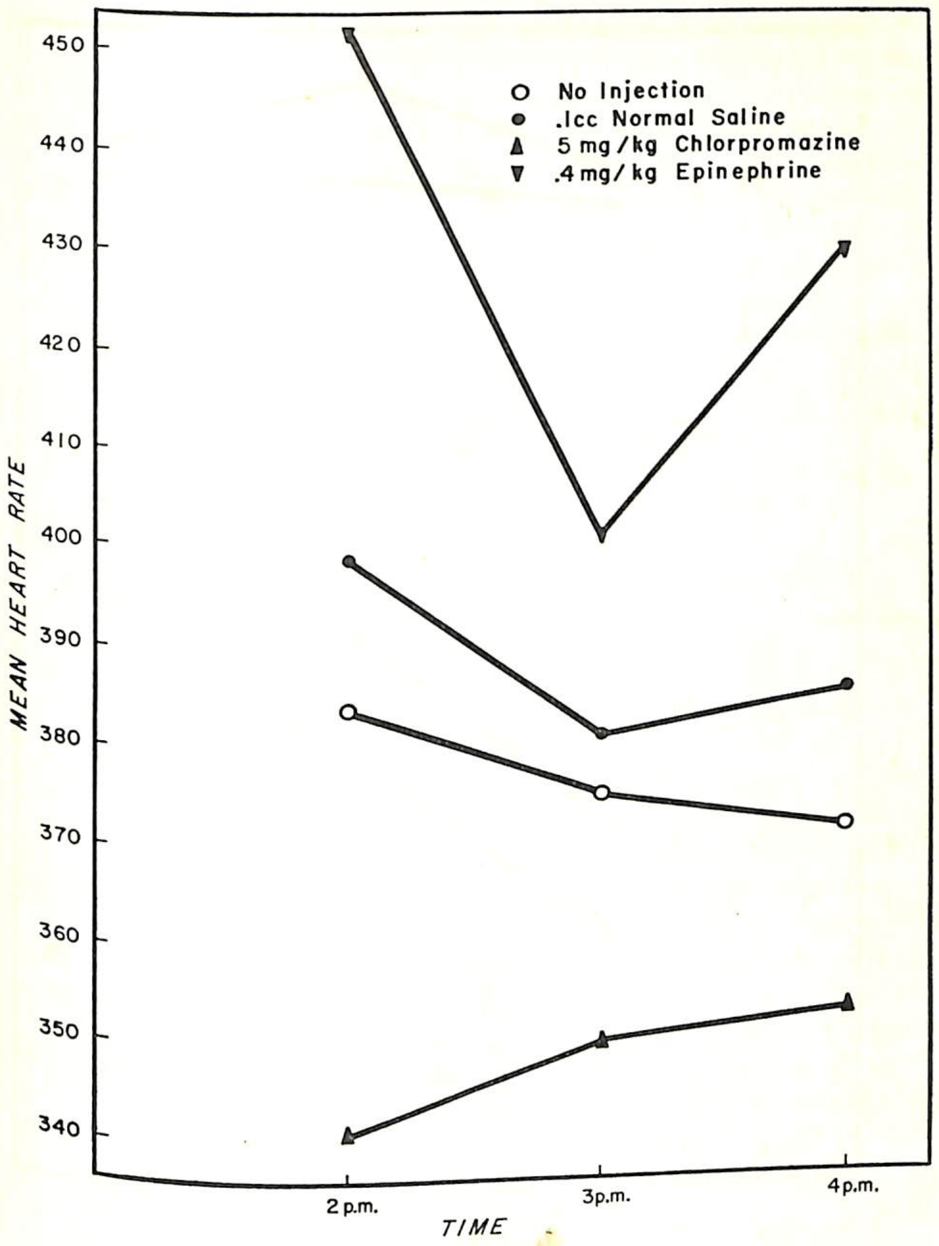

FIGURE 2
MEAN HEART RATES OBTAINED DURING THREE DAILY RUNS UNDER FOUR CONDITIONS

b. Heart Rate. The average heart rates obtained under the four conditions studies are presented graphically in Figure 2. The mean heart rates for the no-injection and saline conditions are not significantly different. As expected, however, the average heart rates under epinephrine and chlorpromazine are significantly different from each other and each is significantly different from the saline condition value at the 2 PM recording. The mean heart rates under the two drug conditions remain significantly different from one another at the 3 and 4 PM recordings. The difference between average heart rates under saline and chlorpromazine conditions becomes insignificant at the 3 PM recording and the difference is even smaller at 4 PM.

TABLE 2
P VALUES FOR THE DIFFERENCES BETWEEN AVERAGE HEART RATES RECORDED UNDER FOUR CONDITIONS AT 2, 3 AND 4 PM

	Epinephrine	Chlorpromazine	No injection
Saline	2 PM $< .01$ 3 PM $> .05$ 4 PM $< .01$	2 PM $< .01$ 3 PM $> .05$ 2 PM $> .01$	2 PM $> .40$ 3 PM $> .50$ 4 PM $> .30$
Epinephrine		2 PM $< .01$ 3 PM $< .01$ 4 PM $< .01$	

The picture is less clearcut with regard to average heart rate following epinephrine. The mean value at 3 PM is precipitously lower than the 2 PM record and probably reflects the rapid dissipation of epinephrine as noted in the literature (Goodman and Gilman, 1941). The 4 PM heart rate following epinephrine is significantly higher than the saline condition heart rate observed at 4 PM and is unexplained unless it reflects some sort of rebound phenomenon.

c. Relationship between heart rate and bar pressing rate. The mean heart rate values and the mean bar pressing rates obtained under each of the four experimental conditions at 2, 3 and 4 PM are plotted in Figure 3.

The Pearson r between the heart rates and bar pressing rates was —.0002, while the *eta* calculated between these same sets of values was .5938 ± .13. The solid line in Figure 3 is a free hand approximation of the line of best fit.

C. DISCUSSION

The data presented here indicate that behavioral efficiency, in this case the emission of a well learned response, can be reduced by the administration of two drugs which had previously been assumed to alter physiological activity in quite different ways. The data agree with our unpublished observation

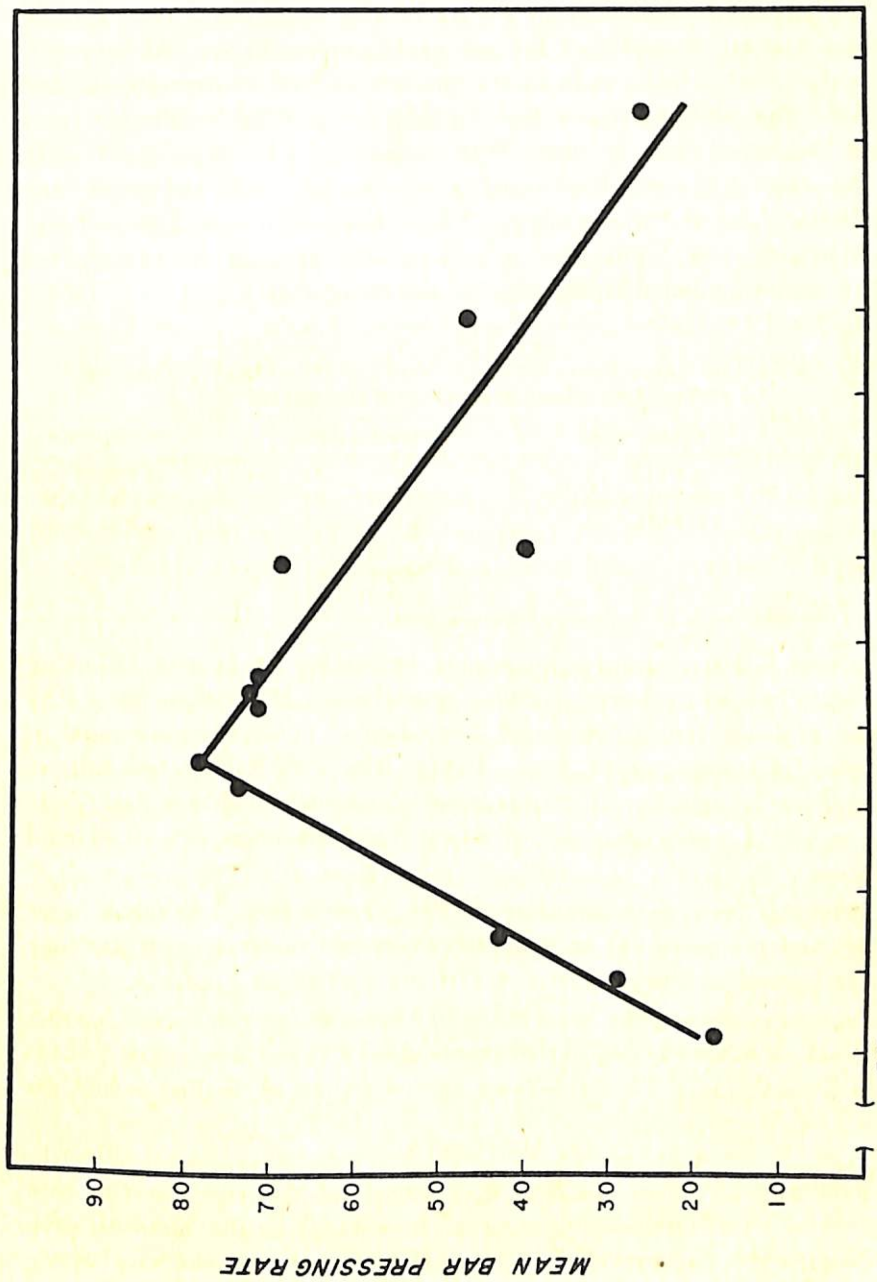

FIGURE 3
MEAN BAR PRESSING RATES PLOTTED AGAINST MEAN HEART RATES OBTAINED AT EACH DAILY RUN UNDER FOUR CONDITIONS

regarding the behavioral equivalence of epinephrine and chlorpromazine in dosages of .4 mg/kg and 5 mg/kg respectively.

Further the data indicate that the use of heart rate as an indicator of physiological activity level does in fact adequately reflect the opposite effects of epinephrine and chlorpromazine which are to be expected on the basis of previous research.

Most importantly, the relationship between mean heart rate and mean bar pressing rate was found to be moderately high and non-linear. The plot of heart rate presented in Figure 3 is a reasonable approximation of the inverted U function predicted on the basis of the concept of activation as most recently discussed by Malmo. These data indicate that the inverted U function obtains between heart rate and rate of bar pressing even when the heart rate is not recorded during the actual bar pressing situation.

This study therefore, provides additional evidence for the deleterious effect which either "high" or "low" levels of physiological activity may have on behavioral efficiency in addition to furnishing further support for the hypothesized inverted U shaped function which describes the relationship between level of activation and behavioral efficiency.

D. Summary

Ten male albino rats were trained under 21 hours of food deprivation to obtain food reward in a Skinner box. Their response rate was observed three times daily under conditions of no injection, .1 cc of normal saline, .4 mg/kg of epinephrine and 5 mg/kg of chlorpromazine. Results were: (*a*) Epinephrine and chlorpromazine significantly reduced bar pressing rate from the rate observed following saline injection. (*b*) The doses of epinephrine and chlorpromazine used were behaviorally equivalent. (*c*) The overall relationship between heart rate and bar pressing rate closely resembled the inverted U function predicted on the basis of an activation hypothesis.

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The Journal of Genetic Psychology, 1962, **100**, 275-288.

A FURTHER EXPERIMENTAL INVESTIGATION OF THE RELATIVE SPEEDS OF LEFT AND RIGHT-HANDED WRITERS*

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A. Introduction

In a previous study (16) the present writers reported the results of an investigation of the differences in speed of left-handed and right-handed writers. Sample groups of left- and right-handed children aged eight to 14 years were given speed tests in simple repetitive writing, pattern-tracing and stroke-making. The results showed no significant differences between the handedness groups on any of these tests when differences between sexes and schools were taken into account. As far as writing is concerned these findings concur with those of another recent British study (4) and of a recent Swedish study (17), but are at variance with those of such authorities as Burt (3) and Hildreth (9) both of whom state that the left-handed writer reaches only about four-fifths the speed of the right-hander. Furthermore several points of interest both for pedagogical practice and for skill-learning theory remain unanswered.

Firstly, our subjects had used pencil. Now it may well be that such difficulties as the left-handed writer faces spring, not from central or neurological problems of adjustment as has been widely claimed (e.g., 13), but from the simple mechanical fact that the nib of a pen pushed instead of drawn across the paper tends to dig into the surface. At the same time the left-handed writer is in constant danger of smudging his writing with his writing hand, whilst the ink-flow down the nib tends to be uneven. These facts are a matter of observation and have been noted as such by most students of left-handed writing. Many authorities argue directly from them that children writing with their left hands will necessarily reflect their difficulties in their writing. Thus, Barton Hall (1) states: "The left-handed pupil is usually a slow, clumsy writer, has difficulty in learning to use ink without smudging his work. . . ." (page 123.) The present writers themselves felt that although no significant differences had been found on the pencilled tests such differences might become apparent when pen and ink were in use. It

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* Received in the Editorial Office on May 9, 1960.

may be noted that pen and ink were used in Clark's admirable investigation (4), but her group of 330 children included only 18 left-handed subjects in the one (11-12 year) age-group studied. Trankell, in his careful and extensive study (17) of 637 Swedish left-handed children, does not state whether pencils or pens were in use.

Secondly, the "skilled" writing test used in our battery had been a speed test of only sixty seconds duration. It might well be asserted that the left-handed child can indeed rival his right-handed counterpart for such a short time, but that over a more protracted period his difficulties would cause him relatively more fatigue, with a consequent tailing-off in speed. For instance, Clark states: "They [children writing with the left hand] do, however, suffer more from fatigue when subjected to prolonged periods of writing than those using the right hand" (4, page 82).

Thirdly, our writing test involved only simple, mechanical repetition. It might be claimed that in a more complex task the left-hander's output would again decrease relative to the right-hander's.

Fourthly, it was thought possible that during the performance of more fatiguing or more complex writing tasks certain central factors might be expected to operate more noticeably. For instance, an emotional "blocking" has been postulated as being attributable to the left-hander's perceptuo-motor difficulties (12), and emotional resistance might be expected in view of his presumed negativism (2), his instability (14) and other temperamental characteristics (3).

Fifthly, it is widely believed that some left-handers can, in fact, learn to write quickly, but with great loss of legibility. Clark states: "The majority of those writing with the left hand produce writing which is either neat or speedy, but seldom both; this is admittedly a failing not entirely confined to them. . ." (4, p. 82). It seemed particularly likely to us that a left-hander's attempts to write at speed with pen and ink must result not only in smearing and blotting but in relatively more deterioration of formal quality than would be noted in the writing of an equivalent right-hander.

Lastly, it is possible that the factor of age, which was not high-lighted in our earlier study, plays a significant part. The writers felt that differences in speed might be detected in younger age-groups due to the relative difficulties encountered by the left-hander in the early stages of writing, particularly during the introduction of pen and ink. Such differences might well be observed to diminish with further training and development.

The present study, then, was designed to investigate these six possibilities.

B. INVESTIGATION

The three writing tasks to be described were chosen to gauge subjects' speed of performance at different levels of complexity and difficulty. The subjects' output could be analyzed in terms of speed and quality, and their results on the more prolonged tests might also be expected to reflect differences in attitude and persistence.

On all tests each subject was allowed to use the pen with which he worked normally. This was either a standard school-issue holder and nib, or a fountain pen. It had been intended to preclude the use of ball-point pens on the grounds that these were mechanically too similar to pencils, but in no instance did school regulations allow the use of these in any case.

1. *Tests and Procedure*

a. Simple, repetitive writing test. This was identical with the pencil writing test in our earlier study. The children were given sheets of ordinary school writing paper lined at 8mm. intervals. At the head of each sheet the words "cats and dogs" were written. Each child was required to write these words in print or in script as he chose, as neatly and as often as he could with his preferred hand. The time limit was sixty seconds.

b. Prose transcription. A passage of 300 words was chosen from "Alice in Wonderland" with the following criteria in mind: (*a*) familiarity of vocabulary, with no unusual spellings; (*b*) content which might be expected to offer some interest and amusement to subjects of the age-groups concerned; and (*c*) the letters of the alphabet appearing in roughly the same proportions as they occur generally. The passage was written up on blackboards. One of the testers read it through to the subjects, after which they were asked to read it through to themselves twice and encouraged to ask about any word which might puzzle them. Then they were required to copy as much as they could in three minutes. They were urged to write as neatly, but as quickly as they could.

The fatigue/persistence test consisted of a prolongation of the above test. On completion of their three-minute "stint" the subjects were told to ring round the last letter written and then were immediately instructed to continue for a further minute. This was continued minute by minute up to a total of ten minutes, the subjects being continually exhorted to keep up their speed. This time limit was judged, after several trial runs, to be about the maximum time that the children might reasonably be expected to persist and cooperate.

c. Free composition. No time limit was set for this, the subjects merely being instructed to write an essay on one of the following topics: "What I did at Christmas," or "The Summer Holidays." The topics were deliberately limited in choice and restricted to narrative-descriptions in order to avoid the difference in approach discussed by Watts (18), Schonell (15) and others.

2. *Subjects*

In England the transition from pencil to pen and ink varies widely from school to school, as does the transition from script to cursive writing in which the pupils are generally required to have some facility before they are introduced to the use of pens. For the purposes of this study, however, it was decided that all children would be well accustomed to the use of pen and ink by the time they were 9½ years, and this age was taken as the lowest limit. Three age-groups were then decided upon—9½ to 10½, 11½ to 12½, and 13½ to 14½.

Tests 1 and 2 were administered by the writers to 116 children drawn from seven schools. Three of these (A, B, and C) were junior schools and four (D, E, F and G) were secondary modern schools. All were roughly equal in size, each containing between 340 and 360 pupils. They were believed to represent a fair cross-section of the local school population, excluding the extremes of ability represented by grammar school pupils at the one extreme or educationally sub-normal pupils at the other. The groups of junior school children used in this study were not drawn from among those who were deemed likely by their head-teachers to proceed subsequently to grammar schools. Nor were they drawn from such "remedial" or "special" classes as existed in some of the schools.

The left-handed subjects composed the majority of the left-handers in the age-group at each school. Where there was a choice the desired number of children was taken in alphabetic order of surnames. The same sampling method was used for selecting subjects for the right-handed groups, but these were roughly equated with the left-handers by drawing the same numbers of each sex and in terms of school class and age-group.

The data for Test 3, the composition, were obtained from further schools, three junior and three secondary modern. Three boy and three girl left-handed writers and equivalent numbers of right-handers were drawn from each of the junior schools, and groups of the same composition from each of the two older age-levels represented in each secondary modern school. Thus there were 36 children in each age-group—a total of 108. As there is known to be a relationship between essay-writing and also that the

TABLE 1
Distribution of Subjects by Ages, Schools, Sex and Handedness. Tests 1 and 2.

Age group			Schools A	B	C	D	E	F	G	Totals
9½-10½	Left-handed	Boys	3	3	3					9
		Girls	3	3	3					9
	Right-handed	Boys	3	3	3					9
		Girls	3	3	3					9
11½-12½	Left-handed	Boys				5	5			10
		Girls				5	5			10
	Right-handed	Boys				5	5			10
		Girls				5	5			10
13½-14½	Left-handed	Boys						5	5	10
		Girls						5	5	10
	Right-handed	Boys						5	5	10
		Girls						5	5	10
										116

amount written correlates with essay-writing proficiency (15) the groups for this test were not only equated as for Tests 1 and 2, but handedness pairs were matched also in terms of achievement as represented by class orders of merit.

A total of 224 subjects was thus drawn from thirteen schools, none of which had been used in our previous study.

As in the earlier study, problems of definition were avoided by accepting as "left-handed" merely those children who used their left hands consistently for writing. No attempt was made to establish degrees of laterality or to determine whether any changes of handedness had taken place. These factors have been investigated fully by Trankell (17), who divided his left-handed groups into various categories according to their writing hand habits.

3. *Scoring*

Tests 1 and 2 were scored in terms of legible letters written as was the "fatigue test."

Test 3 was scored in terms of legible words written.

All the secondary children taking Test 2 had been subjected to the ten-minute transcript "fatigue test." For purposes of comparison, however, subjects were paired not only for hands, age, sex and school but for *scores on the three-minute transcript test.* An arbitrary limit for the transcript score difference between members of each pair was set at 15. By this criterion, however, only 24 pairs could be matched. The other available left-handers at three of the schools were therefore tested and eventually 30 pairs were satisfactorily matched.

In order to test the hypothesis that left-handed writers can write with speed or neatness, but not both, the transcripts were judged for quality. It was found, as it had been in Clark's study (4), that it was extremely difficult to set up acceptable objective standards of handwriting quality. There are no handwriting "scales" in general use in this country. But in any case several different types of writing could be identified in our subjects' work, ranging from copperplate to roman italic, with considerable variations even within schools. Eventually we followed Clark's method. Scripts were presented in pairs (a left-hander's and a right-hander's of the same sex, age-group and school) to eight judges. Identifying marks were concealed and both the spatial positioning of each pair member and the order of presentation of the series were randomized in a prearranged manner. The judges (four teachers, two educational psychologists and two shorthand-typists) were asked merely to choose the "better" script of each pair or to adjudge them "equal." This was done for fifty "pairs" selected by school, sex and age, and also for the thirty pairs who had been selected for the "fatigue" comparisons.

C. Results and Discussion

The means of performance for handedness groups at each age level are presented in Table 2. Also tabulated there for comparison are equivalent figures which have been abstracted from the data utilized in our earlier study, where the children were writing with pencil.

Firstly it may be noted that, contrary to expectation, the mean speeds of the pencil-writing groups are not higher than those of pen-writers for either handedness group at any age level. But, as will be emphasized, the variations between schools have been found in this investigation, as in the earlier one, to be considerable. As the pencil-writers and the pen-writers were drawn from different schools it is, in fact, surprising that there is such a degree of concurrence in these results.

As would be expected there is a noticeable and consistent improvement with age on both the timed tests. But this result differs from those of Wills (20), who found a slight but significant *decrease* in writing speed after the age of 11.

At first glance it would seem that the right-handers' speed on simple repetitive writing is superior to that of the left-handers in the youngest age-group but that this difference disappears with age. In fact, however, the differences found here are not significant. Furthermore the results of the same groups on the three-minute transcript writing do not support this idea, but actually show the reverse tendency.

Although the manner of presentation, the material and the timing were all different from those employed by Clark it is of interest to note that the results on transcript writing of our 11½-12½ year group are very similar to those of her 11-12 year subjects. Both our subjects and those of Clark seem to have achieved writing speeds well below those of American children of similar age as calculated by West (19) for instance. As Clark points out it is generally accepted that American children write more rapidly than British children "since the emphasis in the teaching in the United States is on movement rather than on form, whereas in Britain the emphasis is on form at the expense of speed" (4, page 175). As a matter of interest, this presumption is not supported by reports such as The Instructor survey (10) from which it would appear that the methods of handwriting instruction employed in Texan schools are very similar to those in general use in Britain, being, if anything, somewhat *more* formal.

TABLE 2
TOTAL MEANS BY AGE AND HANDEDNESS

Test	Time	Hand Group	Ages 9½-10½ M	9½-10½ SD	11½-12½ M	11½-12½ SD	13½-14½ M	13½-14½ SD
1. Repetitive Writing (ink)		L	51.83	14.61	62.68	17.58	81.45	11.45
(number of letters)	1 minute	R	56.38	13.83	63.00	12.98	81.80	12.49
Repetitive writing (pencil) (number of letters)		L	54.65	15.08	61.25	21.02	81.58	16.79
(from Smith & Reed, 1959)	1 minute	R	52.30	23.37	66.75	20.57	82.92	17.50
2. Transcripts (ink)		L	141.33	34.18	168.50	35.68	195.20	33.12
(number of letters)	3 minutes	R	140.61	34.75	159.18	26.63	202.20	47.59
3. Essays (ink)		L	156.77	56.58	224.11	84.21	211.66	35.35
(number of words)	Untimed	R	163.00	63.81	207.61	111.59	226.50	81.58

Our subjects' essays are considerably longer than those reported in LaBrant's classic study of language (11); but her Group A were required to write an argument and were limited to a time of twenty minutes. On the other hand Harrell's (8) subjects, who were required to describe a short film, wrote rather more than our subjects at each age level. Our subjects' means are, however, surprisingly similar to those in the standard work with English children by Schonell (15) and to those reported by Ford (5) from New Zealand.

It will be noted that the essays of our oldest children were not significantly longer than those of our 11½-12½ group. Ford's findings were similar, inasmuch as he found no regular increases above the age of twelve. He felt that this was due, at least in part, to the fact that in New Zealand the more intelligent 13- and 14-year-old children leave the "primary" schools, a reason which does not apply to our groups.

The difference between the sexes, reported by LaBrant, Harrell and Ford as well as by many other investigators was noticeable also in our study (see Table 6). At the 9½-10½ and 13½-14½ year levels these differences are significant at the 0.01 level of confidence. Some caution might well be displayed in accepting this finding as no attempt had been made to equate groups or match pairs between sexes as well as between hands. But as it happens in only one case—in the 13½-14½ year group—did it occur that a pair of boys was drawn from a lower class in one school than an equivalent pair of girls. It is perhaps of significance that in only one other section of our analysis—that of transcripts at the 13½-14½ year level—is any other significant sex difference to be found.

In Table 3 are presented our major findings in the form of analyses of variance of the three main tests. It will be noted that no significant differences whatsoever were found between left- and right-handed writers on any of the tests at any age level. Furthermore, as in our previous study, it is evident that neither handedness nor sex have contributed to such differences as do exist to anything like the same extent as the schools from which the groups were drawn.

Table 4 contains the results of the ten-minute "fatigue" test for the thirty handedness pairs who, it will be remembered, were matched not only for age, sex and school, but also for scores on the three-minute transcript test. These results are expressed in terms of mean group increases per minute from the end of the transcript test proper through to the ten-minute limit. The differences are not significant, but two interesting findings are apparent. Firstly, contrary to expectations the left-handed writers do

TABLE 3
Analyses of Variance of Group Speeds on Three Writing Tests

	Age levels								
	9½-10½			11½-12½			13½-14½		
Test 1									
S. of V.	df	S. of S.	V.	df	S. of S.	V.	df	S. of S.	V.
Hands	1	560.33	560.33	1	3.98	3.98	1	7.65	7.65
Sexes	1	243.00	243.00	1	378.98	378.98	1	56.65	56.65
Schools	2	4100.17	2050.08	1	6.98	6.98	1	211.65	211.65
Residual	7	6299.17	899.88	4	1178.79	294.69	4	1408.45	352.11
Total	11	11202.67	—	7	1568.73	—	7	1684.40	—
		F = 0.62			*F* = 0.013			*F* = 0.021	
Test 2									
S. of V.									
Hands	1	14.08	14.08	1	2775.13	2775.13	1	2450.00	2450.00
Sexes	1	52.08	52.08	1	1553.13	1553.13	1	3042.00	3042.00
Schools	2	12432.17	6216.08	1	14535.13	14535.13	1	59858.00	59859.00
Residual	7	18490.59	2641.51	4	15956.49	3989.12	4	18828.00	4707.00
Total	11	30988.92	—	7	34819.88	—	7	84178.00	—
		F = 0.005			*F* = 0.69			*F* = 0.52	
Test 3									
S. of V.									
Hands	1	1045.33	1045.33	1	7350.75	7350.75	1	2324.08	2324.08
Sexes	1	84001.33	84001.33	1	574.08	574.08	1	24570.75	24570.75
Schools	2	89322.17	44661.08	2	100423.17	50211.58	2	310510.17	155255.08
Residual	7	20767.84	2966.83	7	464256.92	66322.41	7	4903.92	700.56
Total	11	195136.67	—	11	572604.92	—	11	342308.92	—
		F = 0.35			*F* = 0.11			*F* = 3.31	

not show any relative deterioration in speed with fatigue. There is a tendency, in fact, for them to show less decrement than their right-handed counterparts. Secondly, and again contrary to expectations, neither group show pronounced tailing-off in performance. This is despite the fact that after about the sixth minute of writing most subjects showed behavioural signs of fatigue and decreased motivation, becoming restless, grimacing and even complaining audibly.

TABLE 4
Mean Increases Per Minute of Handedness Groups (Each N = 30) Paired for Scores on 3-Minute Transcript Test

	Mean numbers of letters written in minute intervals:						
	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Left-handed writers	56.1	54.5	50.6	53.1	55.8	51.5	56.4
Right-handed writers	58.6	52.8	51.0	52.4	52.8	51.7	53.8

Our suspicion that the left-handers' fatigue decrements might be reflected by poor quality of handwriting even more than loss of speed is not supported by the findings presented in Table 5. Here are tabulated the judgments of eight observers of the scripts written by the thirty matched pairs of children. Thus, in fourteen instances Observer number 3 adjudged the scripts written by the left-handed members of the pairs to be superior, in twelve instances she preferred those of the right-handers and in four instances she felt that the members of the pairs were equal in merit. Three of the judges preferred a preponderance of left-handed writers' scripts, three a preponderance of right-handed, and two preferred equal numbers of scripts by writers of each handedness group. Considerable variation between judges is apparent; only nine scripts were consistently preferred to their partners. The judgments expressed of the other fifty "pairs" of scripts are not presented here as their proportions were almost identical to those above.

TABLE 5
Handwriting Quality—Judges' Preferences for 30 Pairs Matched for Speed

	Judges								
	1	2	3	4	5	6	7	8	Totals
Left-handed writers	14	13	14	10	12	15	19	13	110
Right-handed writers	10	14	12	15	16	15	11	13	106
Equal	6	3	4	5	2	0	0	4	24

In an attempt to explain in part our findings regarding school differences we checked with each school concerned as to whether any particular methods were employed or extra attention given to help left-handed writers. In no case, apparently, did this occur. None of the teachers approached had even heard of such aids as Gardner's manual (6). If special help is given this presumably takes place at the infant or early junior level. A survey of infant teachers revealed, however, that no consistent policy obtained. These teachers generally seemed to be well aware that their left-handed pupils faced relatively more difficulty in learning to write, and were extremely sympathetic in their approach. But the only common policy expressed was a comparatively negative one—namely that it was unwise to force a left-handed child to write with his right hand. This very permissiveness, however, represents a radical change from the pedagogic outlook prevailing at the beginning of this century, as Burt (3) has pointed out.

TABLE 6
MEAN LENGTHS OF ESSAYS BY GROUPS IN TERMS OF SEX, HAND AND AGE

	Age-levels:	9½-10½	11½-12½	13½-14½
Boys	Left-handed	130.5	205.1	196.3
	Right-handed	133.4	222.0	206.1
Girls	Left-handed	183.0	243.1	227.0
	Right-handed	192.5	193.2	246.8

D. CONCLUSIONS

We are now in a position to examine more closely the six possibilities raised in our introduction.

Firstly, despite expectations, we have found no evidence that the mechanical difficulties of using pen and ink handicapped our left-handed writers to any significant degree as far as speed was concerned.

Secondly, subjection to fatigue stress up to a limit defined by practicality did not produce higher decrements of speed in our left-handed writers as compared with our right-handed writers.

Thirdly, the same findings applied to writing tasks more complex than that of mere mechanical repetition.

Fourthly, if emotional "blocking" or negativistic attitudes were present they were not reflected in these results as far as quantity of output was concerned.

Fifthly, our children who wrote with their left hands did so with as much neatness as our right-handers.

And lastly, the above lack of differentiation between handedness groups seemed to apply with equal force to our youngest as to our older groups.

In general the results of this study reinforce those of our earlier investigation. They do not support some current authoritative opinion which may be based on studies carried out earlier this century. We suggest that our findings and those of two other recent investigators may reflect a real change over the years which itself is the outcome of a change (albeit undirected and even unconscious) in pedagogic outlook and practice. For the children we have tested who write with their left hands apparently do so with neither less speed nor less legibility than their right-handed counterparts.

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The Journal of Genetic Psychology, 1962, **100**, 289-308.

VARIOUS FACTORS PLAYING A ROLE IN CHILDREN'S RESPONSES TO FLAT COPY*[1]

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A. Problem

Pen or pencil tracings are customarily used both to study the developmental course of perception and to test perceptual-motor development. Such materials have been criticized on the basis that they utilize "forms" representing highly artificial conditions of stimulation and that the "forms" in this case lack the relationship to surface or field that "forms" produced by ordinary surfaces enjoy. Drawn contours[2] exist as "forms" chiefly in the sense that they stand for plane projections of the edges of ordinary objects or exist as symbols for geometric abstractions (9). If Gibson is correct, such materials represent equivocal stimulus situations bound to produce ambiguous responses.

Notwithstanding, there is a developmental course associated with the visual appreciation of such materials. Originators of both mental age and point scale type tests for intelligence have repeatedly discovered that responses to printed contours have a diagnostic function. Despite the artificiality of such visual items, there is apparently a characteristic way of dealing with such materials within a given range of development and also apparently the mode of response changes as a function of this development.

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* Received in the Editorial Office on May 16, 1960.

[1] The authors wish to acknowledge their indebtedness to N. MacLaurin, Michigan State University; M. Bushkoff, Michigan State University Laboratory Preschool; V. Ralya, Haslett Elementary School; and D. DeHardt, Michigan State University Spartan Nursery; for assistance rendered during the study.

[2] In common practice a number of terms such as edge, border, contour, etc., are used interchangeably. Not only are they so used with reference to one type of item, but each word is used to refer to more than one type. This freedom has been found confusing in certain situations in which greater clarity and precision are mandatory. On this account, Bartley (4) has suggested using *edge* for the boundary of the seen object, *border* for the boundary of the retinal image, and *contour* process for what must happen in the retina and rest of the nervous system to provide for the sensory end result. We are not following these distinctions here since we are dealing with a class of phenomena that is not usually recognized and, although this class might well be given some other name than contour, it would not be clear why this was done unless detailed explanation was forthcoming. This does not seem advisable here.

What we intend to do here is to inquire into the significance and developmental course of the visual appreciation of such items.

It is possible that various inadequacies of response to such materials are related to the way in which they are regarded. For example, the ordinary Stanford-Binet test of intelligence presents a "diamond" tracing at year VII. The child is required to reproduce this several times. Ordinarily, children of seven years and older can do this satisfactorily, while those less than seven by and large fail. Since a large proportion of all 6-year-old children can reproduce a "square" acceptably (22, 8), the difficulty is likely of a perceptual rather than a motor character. In order to understand such changes, one might inquire into the significance of the visual material for the perceiver.

Following Gibson's lead, one might suppose, on the one hand, that the child might recognize the tracing as a symbolic form standing for a geometric abstraction. Such a subject would be dealing with "form" in the sense of sheerly symbolic markings. This would give the reproduced "form" about the same status as the reproductions of symbol markings such as "3," "100," "red," "school," etc. It would thus be just a symbol meaning "four sided polygon with equal sides and unequal angles." Or, the tracing might be recognized as the plane projection of the edges of some external surface—as a schematic picture, so to speak. It is not possible to say just what external surface would be represented, however, because of what is called geometric equivalence (3), that is, because any one set of lines describes a visual form that an indefinite number of visual surface edges might fit. Figure 1 shows how the edges of several different surfaces differently oriented to the line of regard may produce equivalent plane projections, and hence diamond tracings. It is possible that a performance would be affected if the child were to regard the tracing one way rather than another.

It seems more likely, however, that something other than "form" is involved when tracings are presented. Namely, "shape" may be involved. Besides the lines of the tracings, the contours, one must recognize that there is the material inside and outside the traced lines to be considered. Thus, in the case of a "diamond" tracing, there are potentially three things to deal with: an area outside the tracing, an area inside the tracing, and the connected lines of the tracing itself. The areas are sometimes referred to as figure and ground. In the event that either area becomes figured, it assumes "shape." Thus, "shape" is not necessarily similar to "form" when "form" is identified with the tracings or contours per se. The stimuli for "form" are abrupt gradients of light. Ludvigh (15, 16) states this to be a function of higher derivations of energy with respect to distance on the retina, while "shape" identifies the relatively homogeneous areas of light contained within the contours. Perhaps these alternatives will not seem intuitively necessary or obvious to the reader. Nevertheless, the empirical findings of various Gestalt psychologists, phenomenologists, and what Rubin calls "adspective" psychology insist upon these distinctions.

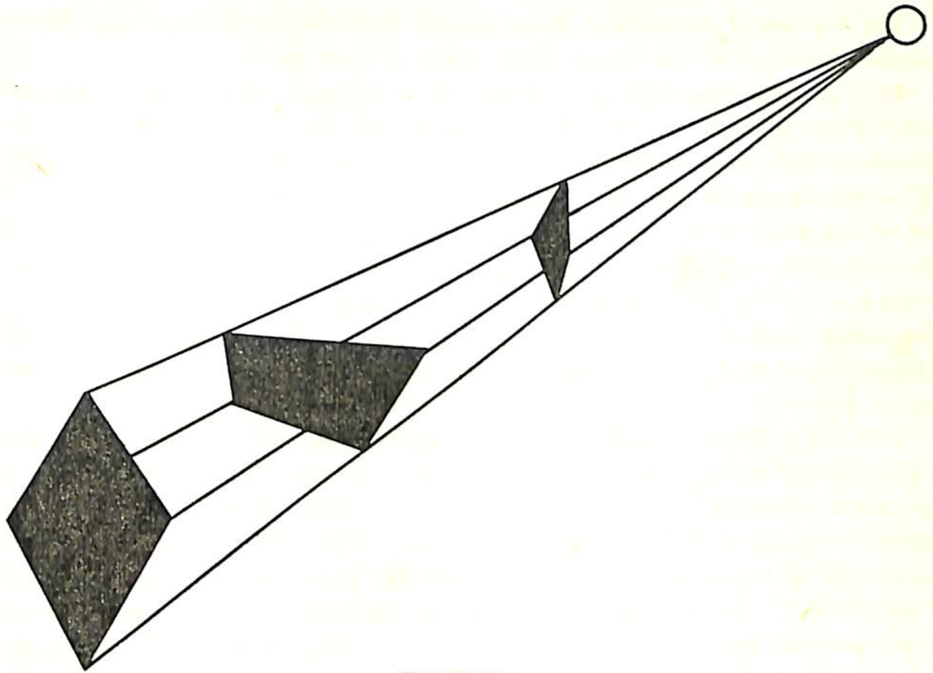

FIGURE 1
A Diagram to Indicate That Various Forms May Subtend the Same Set of Visual Angles Depending Upon Their Orientation to the Viewer

Galli and Hochheimer (7), for example, divided fields by a single contour and showed that, although the same tracing necessarily exists from the right to the left side, the halves of fields so divided take on much different shapes. Hence, we must allow another alternative to those suggested by Gibson. The child's drawing may exist as a portrayal of perceived area or shape. It is the specific intention of our experiment to determine which of the alternatives are predominant in ten groups of observers separated from one another by age.

B. Materials and Procedure I

Several sets of materials were used. One set will be described now and the others later on in this paper.

The first set of materials consisted of a penned "diamond" much the same as that used in the Stanford-Binet tests. This served as the standard stimulus. Five comparison targets were used. The first of these was a black wire outline identical to the markings on the paper; the second, a white cardboard area identical to that within the penned "diamond"; the third, another such area but with a black edge penned on; the fourth, a cardboard area identical to that outside the penned "diamond"; and the last, another such area with a penned contour bordering the hole. The character of the materials can perhaps be more clearly visualized if one does the following. Take a 3 × 5 inch filing card and ink a Stanford-Binet "diamond" in the center, long axis corresponding to the long side of the card. Letter the center area "a," the tracing itself "b," and the area outside the tracing "c." The first comparison target corresponds to "b" alone, the second to "a" alone, the third to "b" and "a," the fourth to "c" alone, the fifth to "c" and "a." In order to preclude other surfaces from incidentally affecting the matchings, all targets were presented on suspended glass plates. In the case of the comparison targets, the plate was 12 × 5 inches and held by end blocks 3-1/2 inches off the table. The standard was put on a separate glass plate 6 × 5 inches, held by end blocks 2-1/2 inches off the table. The table on which the materials were set was covered by black cloth. It must be recognized, however, that the target features that we have attempted to isolate by the manipulations just described cannot actually be isolated as completely as intended. In all cases, all these features are present, but it is expected that the manipulations are such as to emphasize the item intended, one at a time, and suppress the others.

The procedure was to put the comparison target plate back of that for the standard. Comparison targets were then arranged in random orders for each subject and the standard target laid in place. The subjects stood and looked down at the targets. The experimenter explained that the comparison targets were all similar to the standard in some respect, but that he wanted the subject to point to the comparison target "most like this" (pointing to the standard). After the response was given, the target selected was removed and the experimenter said, "Now, which one is most like this?" (pointing to the standard). The second selection was removed and so on until the five comparison targets were ranked in terms of preference.

C. Subjects

Nine groups of children and one adult group were used. The youngest group of children were all in their third year, the next group all in their fourth year, and so on through year 11. The number of children in each age group varied from 14 to 24 (see Table 1). Both boys and girls were used. The groups five and older were from public schools. Whole classes were used. Although no formal estimates of intelligence were available, the lower strata of ability was not included because these were segregated in special classrooms. The three and four year olds were from a university nursery. It is likely that the nursery children enjoyed some advantage over ordinary children of this age since they were all offspring of university faculty. The 11-year-old age group also was special in one respect. They had completed a fairly extensive section of a mathematics course considering problems of mensuration one month previous. The problems were conceptualized via textbook line-drawings so that such items were possibly learned to have a new significance. One group of 20 college girls served as the adult group. All 10 groups of subjects were naive with respect to the experimental problem.

D. Results

The simplest analysis is the comparison of shape and contour responses over the various ages involved. In order to do this, Targets (*T*) 3 and 5, those *T*s exhibiting simultaneously both shape and contour properties, were put aside and an index prepared using just *T*s 1, 2, and 4. The index numbers representing the proportion of responses favoring shape (*T*2 and *T*4) over contour (*T*1) are plotted in Figure 2. As can readily be seen, there is initially quite a strong identification of the tracing with the shape of the target. As the child becomes older, however, there is a decrease in the identification of area with the "diamond" tracing, and, conversely, an increase in contour responses until around year nine. The sudden increase at year 11 level, maintained with the college girls, most likely reflects the reassertion of the significance of area brought about by use of formal examples and spatial conceptualization of mensuration in schooling. The responses of the 3-4 ages and those of the 11-college ages were also compared to the 9-10 population using a Z test of proportionality. A two-tailed test of significance shows the differences to be significant at better than the .06 and .05 levels of confidence respectively. The vertical line represents the development of the perceptual-motor appreciation of such a tracing according to Stanford-Binet norms. The Stanford-Binet norm for perceptual-motor development matches the end point of the initial stage in the developmental course of the diamond tracing responses fairly well.

The data can also be studied using a somewhat different form of analysis.

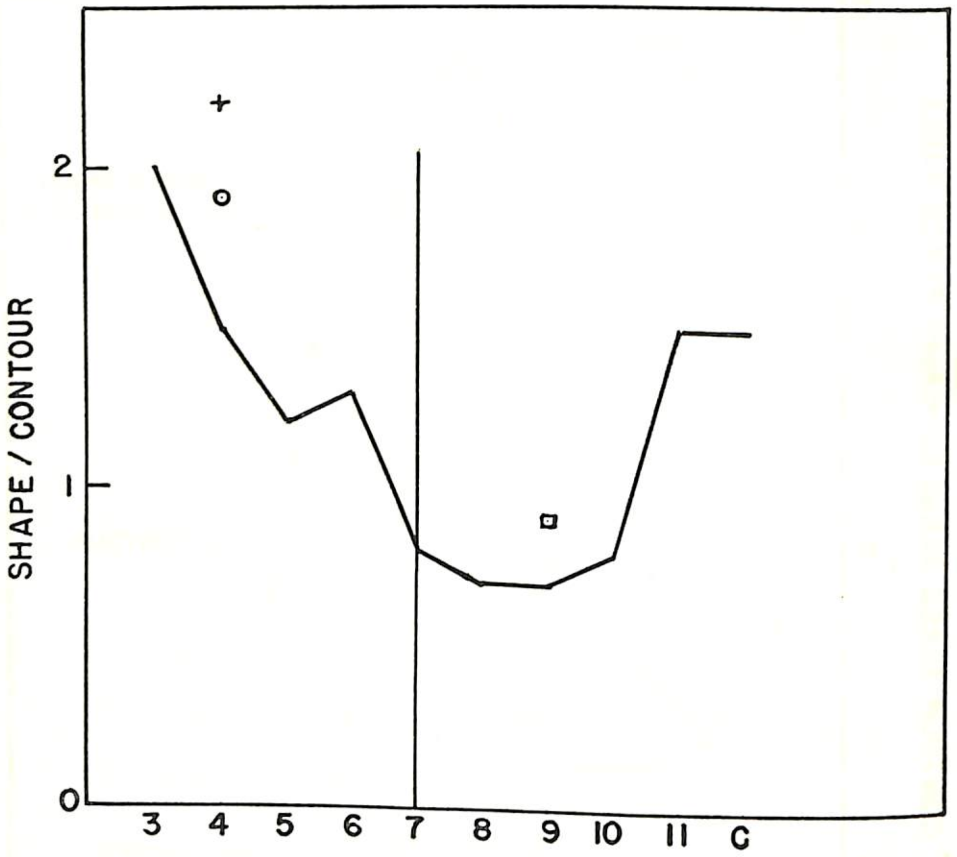

FIGURE 2

The relation between shape/contour and various age levels in dealing with flat copy of a "diamond." The points lying outside the curve represent responses from similar populations to a literal not traced object. C = a college group.

Instead of considering just shape and contour responses, let us also consider the responses to the mixed Ts (3 and 5), and instead of limiting ourselves to just the first response made to this group, let us consider the overall favor of one sort of target in comparison to the others. This latter can be accomplished by weighting the first response 4, the second 3, the third 2, the fourth 1, and fifth 0. Thus, as an example, if, with 18 children, three take $T1$ as first choice, two take it for second choice, two for third choice, four for fourth choice, and seven as last choice, the performance is scored $T1 = 1.4\ [(3 \times 4) + (2 \times 3) + (2 \times 2) + (4 \times 1) + (7 \times 0) = 26 \div 18 = 1.4]$. Using this method, 0 stands for complete rejection and 4

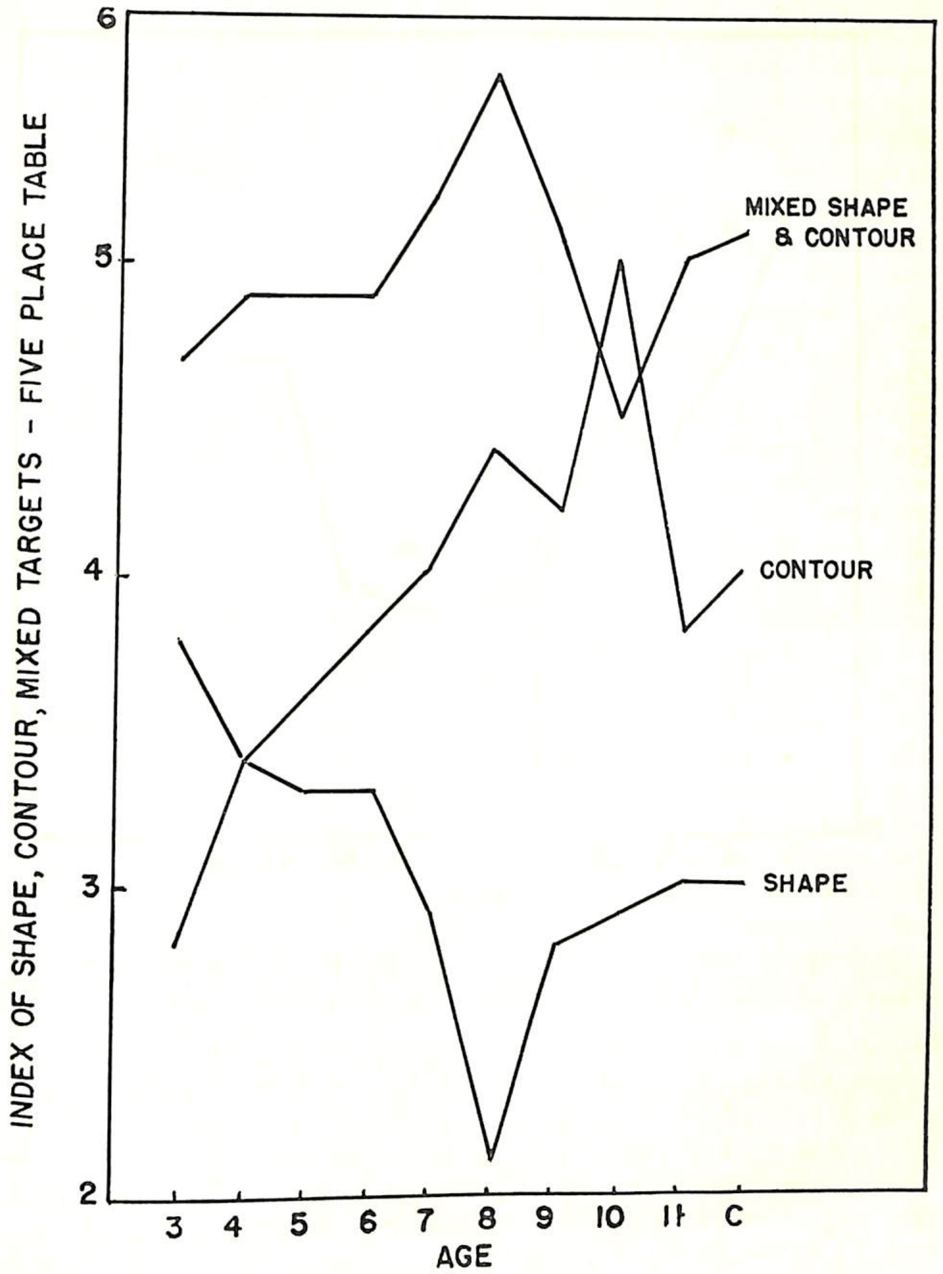

FIGURE 3

Index of Shape, Contour, and Mixed Targets to Age. C = A College Group for complete acceptance. Since there are two shaped targets and two mixed targets, and their possibilities thus run from 0 to 8, the shape and mixed target indexes have been halved to make them comparable to the contour index. By means of this index, the relative position of each class of targets can be expressed analogously for each age level, as has been done in Figure 3. Just about the same features can be seen here that were remarked upon earlier. As maturation and learning proceed, contour is increasingly recognized at the expense of shape until somewhere around age 10. At age 10, contour preference, per se, is at maximum. Past age 10, the preference for contour, per se, declines, while that for shape increases. This is shown in the increased selection of mixed targets, as well as area targets. In addition, one can notice that the mixed targets are favored over both the shaped and contour targets at all but the 10 year age level. Apparently, even at an early age, both shape and contour are associated with the tracing. Another feature worthy of note is the fact that preference for the mixed targets increases and decreases as the preference for shape decreases and increases, but in the latter part of the curve (ages 10, 11, college) it enjoys this relation with the response to contour. Another way of analysing the graph is to say that as shape preference decreases and contour increases, there is initially a rise in both the mixed (that is, shape with contour) and contour targets. With increasing development, however, contour is further abstracted and even the mixed targets decline because of their component of area. Finally, there is a reassertion of the association of shape with the tracing leading to a relative decline. Again, the relation of the Stanford-Binet norms are indicated. Notice in this case that the norm seems to appear before the development of perception has run its full course, but after an over-all "switchover" in preference for contour.

Figure 4 is a graph depicting the relative position of the five targets separately at the various ages. This is a more difficult representation to follow, although it shows the same phenomena already described. In addition, it is interesting to note two additional things. First, the target with the "hole" (*T*4) is taken as readily for first choice as the contour at the earliest ages, and second that the increase in area responses in the older subjects (11 and college) previously noted is due exclusively to an increase in the popularity of the "inside" area. The "outside" area is at a low point during these years. This is precisely the result that would be expected to occur when mensuration is conceptualized in spatial terms given formal representation by tracings. In classroom computation of area, only the "inside" shape is of significance; the outside area is ground and unimportant to the properties the tracing is attempting to convey.

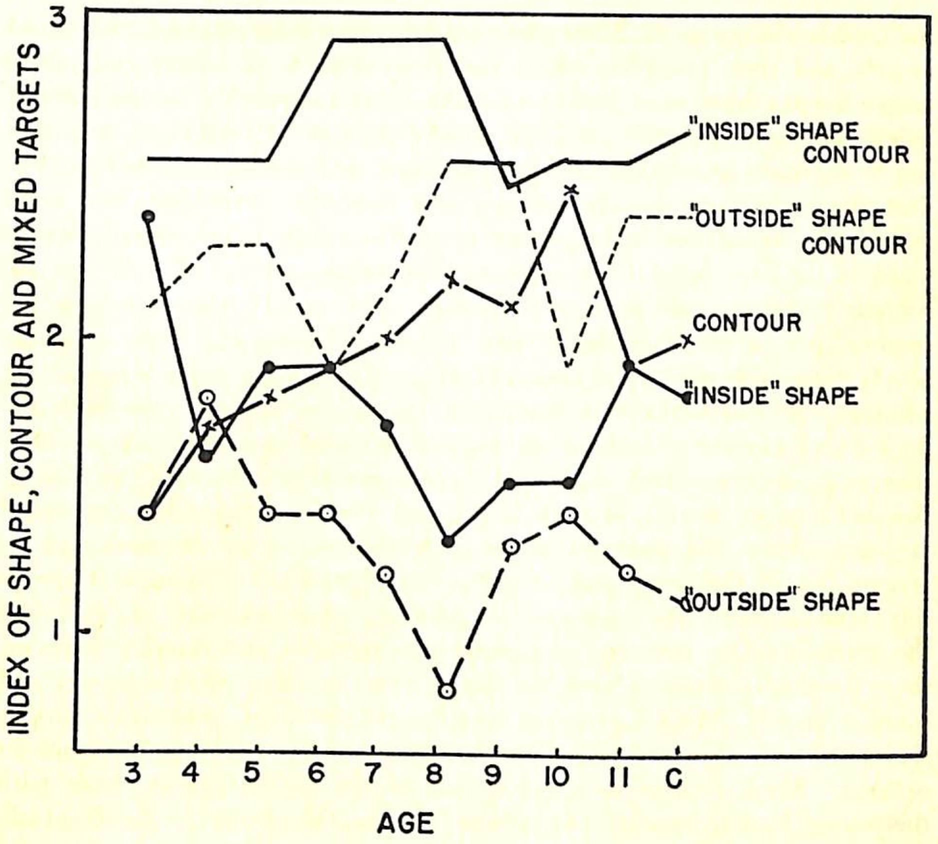

FIGURE 4
INDEX OF SHAPE, CONTOUR, AND MIXED TARGETS TO AGE, USING A FIVE PLACE TABLE. C = A COLLEGE GROUP

Another way of presenting the results is to prepare a table showing the relative frequency with which each comparison target is matched with the original. The relative frequency of selections are given by the percentage entries of Table 1. This is probably the least satisfactory way of depicting the results, and has been included chiefly for the sake of completeness. It is difficult to ascertain the general characteristics of the results by use of such data because of the equivocality of the stimulus situation. Unfortunately, there is not a satisfactory way to study shape separately from contour. They do not occur that way in nature. The contour target has a well defined interior shape associated with it because in looking at the contour, a subject must see a bounded surface beneath if he is to see anything at all. Similarly, with the shapes. There is a steep gradient of illumination around

TABLE 1

Age	N	Target by number	Choice (by percentage)				
			1st	2nd	3rd	4th	5th
3	18	1	17	11	11	22	39
		2	33	22	28	5	11
		3	11	44	28	11	5
		4	22	17	28	17	17
		5	17	6	6	44	28
4	19	1	20	10	20	20	30
		2	20	45	10	25	0
		3	5	25	20	30	20
		4	35	10	20	20	15
		5	20	10	30	5	35
5	18	1	17	6	44	11	22
		2	39	22	6	22	11
		3	28	17	6	17	33
		4	17	33	22	22	6
		5	0	22	22	28	28
6	16	1	25	12	19	12	31
		2	50	25	6	12	6
		3	6	44	0	31	19
		4	12	12	31	38	6
		5	6	6	44	6	38
7	23	1	17	13	34	17	17
		2	56	21	0	4	17
		3	4	26	26	26	17
		4	17	26	21	26	8
		5	4	13	17	26	39
8	15	1	20	27	20	7	27
		2	40	27	20	13	0
		3	13	13	27	13	33
		4	27	27	13	20	13
		5	0	7	20	47	27
9	19	1	26	16	21	16	21
		2	26	10	47	16	0
		3	5	26	0	47	21
		4	26	42	10	10	10
		5	16	5	21	10	47
10	14	1	36	21	14	14	14
		2	28	21	36	14	0
		3	7	21	21	14	36
		4	21	7	28	28	14
		5	7	28	0	28	36
11	25	1	24	12	20	16	28
		2	40	20	12	20	8
		3	20	20	8	32	20
		4	16	36	32	4	12
		5	0	12	28	28	32
College	20	1	25	10	30	15	20
		2	35	30	5	30	0
		3	5	35	20	10	30
		4	30	20	20	20	10
		5	5	5	25	25	40

the edges of these targets and this gradient has a close analogue in the gradient produced by the ink on the standard, etc. The older subjects frequently mentioned this, complaining that they were all equally like the standard. There is probably no way of absolutely isolating one perceptual variable from another. The best that can be achieved is suppression of one factor in favor of another. For this reason, the more sensitive modes of analysis were in order. Various general features already described can be detected to be present in this table, however.

E. Materials and Procedure II

Several relations between the purely visual and perceptual-motor appreciations of tracings have been pointed out. In order to establish the association more certainly, the experimental operations have been extended. This necessitates description of new equipment and procedure.

In this case, the targets were no longer laid on window glass platforms, but spaced in random sequences upon the translucent upper surface of a box 8-1/2 inches wide, 15 inches long, and 6 inches high. The box contained two lamps of 25 watts each, spaced equidistant from the sides, ends, and one another. The illumination showed through the upper surface of the box, which was opal glass, onto which a thin layer of fairly coarse sawdust had been glued. This produced a glowing platform with rather indefinite surface characteristics. Younger children frequently ask if it were "hot" to the touch. A series of "square," "circle," and "diamond" targets were used. Each series contained three comparison targets, one being a black wire contour, another an "inside" area, and the third an "outside" area. Mixed target types were not used. The "circle" targets were all 2-3/4 inches in diameter, the "squares" 2-1/8 inches on a side, and the "diamonds" as before.

With the box covered, the experimenter would show a "square" pencil tracing and ask the subject to reproduce the target by pencil on another piece of paper. This done, the experimenter would remove the standard, place the three "square" targets on the platform, and ask the subject to indicate which target was "most like" his drawing. This choice was then removed and the subject indicated which of the remaining pair was most representative. The "circles" were laid out and the subject asked to draw any one of them. This done, he was asked which of the targets he had chosen to reproduce. Lastly, the "diamonds" were shown and the experimenter asked the child to watch him draw. The drawing was arranged so that the child could see the activity of "diamond" drawing taking place, but could not follow the progress of the drawing, and hence making of the lines, directly. This free-hand product, drawn with fairly heavy strokes, was then shown and the child was asked to point to the target the experimenter "was thinking of" when making the tracing. During the trials, the children were asked what the tracings they made represented.

F. SUBJECTS

The four and nine year olds previously reported upon were used as subjects. In addition, it was possible to arrange for the use of another group of 13 nursery school four year olds, to be called the 4a group, and nine children in the sample of three year olds used before.

G. RESULTS

The proportion of shape to contour responses for the "circle," "diamond," and first "square" matchings are given in Table 2. Since three responses were made to the "square," it is possible to base a proportion on indexes of total performance derived from application of the simple weighting procedure described before. This proportion is included in Table 2 also.

TABLE 2

Age groups	S/C proportions			S/C proportion from overall index
	Circle	Diamond	Square	Square
4	2.2	2.2	3.4	8.5
4a	3.3	1.9	2.1	10.5
9	1.1	.9	3.8	2.6

Comparison of these values shows again that responses to area are much more numerous at the younger than older ages. The only exception to this is the atypical proportion of S/C responses made to the "square" at year nine. The proportion based on first response is probably excessively high, and that on the over-all index excessively low since they are both based on the same sample of responses. The extremes occur because of a bimodal distribution of responses. Statistical comparison of population four to nine and 4a to 9 shows that none of the proportionalities are significant at the .05 level for comparable stimulus situations using the same statistical technique as before. The *N*s involved are small, however. Another feature of interest is the change in the magnitude of the S/C proportions when the aspect of reproduction is introduced. In Figure 2, the index numbers for the diamond tracing have been compared to the data for the purely visual performance. It should be noted that these indexes are uniformly larger than those gotten from the purely visual performance. This suggests that reproductions of tracings are more likely to have area as their reference than is the case when visual inspection alone is attempted. Data for the three year olds is not included. Almost all were unable to represent either the tracings or the objects offered. They appeared not to understand the task, and the halting drawing responses given after considerable aid from the experimenter were unusable for our purposes. Most three year olds are scribblers.

Questions concerning what the tracings represented ordinarily led the older child to name the geometric form. When this did not occur, they always pointed to the target. In contrast, the younger children seldom did either of these two things. The younger subjects identified the tracings with literal conditions, even though they sometimes could not draw those they designated. When objects were named, "block," "window," "kite," and "ball" predominated. Often, however, the child would only give a description such as "it goes this way, then there," which may mean either that they were describing the activity of drawing or describing a concrete situation for which they lacked a name. These forms of behavior were more pronounced among the three than the four year olds.

H. CONCLUSIONS

Responses to "flat copy" (two-dimensional targets incorporated into a two-dimensional field) change with age. This holds true for both perceptual-motor or verbal responses. Standardization of both pen and pencil tracings and amorphous "ink blots" according to age norms explicitly recognize this.

An obverse to this is also true. The more general fact is that capabilities for rendering flat copy, per se, changes with age. A recent writer (14) describes the evolution of tracings as from "disordered" scribbling, that which first appears, to "controlled" or "longitudinal" scribbling, to "circular" scribbling, to recognition of the representative features of tracings, to representative drawing itself. Earlier writers (5, 8, 10) promulgate similar theses. It should be noted in passing, however, that with but slight exception (18) only the evolution of tracings have been studied, and the production of "area" copy ignored. The characteristics of both response sequences are relevant here since we have elected to relate the purely visual to the perceptual-motor appreciation of pen and pencil tracing copy.

Before proceeding, it seems desirable to be clear about the difficulties flat copy present both as stimulus situation and as response. Gibson (9), several years ago, pointed out how little natural significance pen and pencil tracings have. Those assaying the "intelligence" of others via responses to such materials seem to have consistently overlooked the possibility that such materials are ambiguous and thus are other than "simple" and "objective" stimulus situations. Interestingly, the same persons using line-drawing copy as a straightforward stimulus material will, on the other hand, treat flat "area" copy, such as the Rorschach materials offer, as the epitomé of all "unstructured" situations. It may very well be that the use of conventional abstractions in conceptualizing flat copy targets (stimuli) have made thinking about the responses they elicit so difficult as to necessitate couching explanations of simple copy response in terms of complex hypothetical processes that all but ignore the matter-of-fact character of the events being described. Hence, use of new descriptions of such targets, as, for example, description in terms of "shape" and "contour," will perhaps allow one to understand performance changes in perceptual terms. If so, it potentially opens the door to description and explanation of processes supporting the behavior as concrete neurophysiological process. It should be recognized that a fair amount of knowledge bearing upon the neurophysiological correlates of contour and area perception has already been brought together by Bartley (2).

The first conclusion to be drawn from the results is that the young child is primarily oriented to the visual appreciation of area and hence tends to see shape rather than contours. Edges become salient only with age. The following of contours was most apparent at years nine and 10. Other evidence supporting this conclusion can be taken from the earlier work of Lukins (17) and Herrick (13). Both studies showed that an increasing number of profiles, as opposed to structured areas, are drawn as age increases. In the case of Herrick, head profiles increased from 9.5 per cent at year 5-6 fairly constantly until year nine, where 63.7 per cent of the drawings were profiles. She concludes that "Among children of nine years and more the profile seems to be established, though with fluctuations, due perhaps to accidental causes." Her data also indicate a transition period between the shape and profile responses. The transition period is manifest by embellishment of the profile with some of the same features characteristic of the face. The increase with age in the appreciation of contour also seems manifest in the ability to detect "hidden figures." "Hidden figures" demand isolation of contour, since what is referred to as a "figure" is actually a contour disassociated from the shape that ordinarily accompanies it. "Figures" in any areal sense, as shapes, are not at issue. Witkin (24), in fact, discovered that one way to increase the difficulty of detecting contours (figures) was to alter the areal features associated. This was done by introjecting misleading colored shapes into the flat copy. Significantly, the 10 year olds were more affected by this than were the adults. Incidental to this discussion, it is interesting to note that if areal features do become the "hidden figure," detection time soars with adults. In an informal way, the "hidden figure" on page 14 of Hanson's book, *Patterns of Discovery* (11), was shown to adults of Ph.D. level. The "figure" to be seen is a "face" constructed of blotches of white and black with no continuous contour present. Commonly, the time to detect the figure ran close to a half hour even when the figure was pointed to, explained, outlined, etc. Some individuals literally took days. It would be interesting to prepare suitable areal non-contoured materials for inspection and reproduction by both adults and young children.

The second thing to be concluded is that the appreciation of flat copy changes according to the experience the individual has with it. It does not seem to be a perception that matures and becomes fixed in the developmental sequence. The teaching of mensuration to the 11 year olds apparently led to a return of attention to one of the areal features of a tracing. The classroom examples and problems were all couched in terms of tracings in which the contour became unimportant except as to serve as a bound denoting an "inside" shape to be considered and the "outside" shape totally insignificant.

The characteristics of perceptual-motor responses to tracings interest the layman, teacher, medical practitioner, and clinical psychologist. Common sense links the child's inability to reproduce drawings with degree of maturation of the motor system. Most likely, this is not the chief limitation however (23). As is well known, children who can reproduce a "square" tracing cannot reproduce a "diamond" tracing (8, 22). Likewise, even though the motor control of scribblers is not so good as that of adults, even fairly young children make various motor performances well enough to suggest that they are matured enough to execute the simple lines required in the tracings satisfactorily. Children who scribble poke around with sticks quite successfully. The same children also quite readily guide their fingers around objects they cannot draw. Using the pencil as an extension of the finger would not seem to present any particular difficulty.

On the other hand, clinical studies have tended to relate inability to reproduce simple tracings or lineal objects accurately as flat copy to general perceptual-motor development or classes of pathology. Unfortunately, clinical explanations have tended to possess more of a conceptual than factual validity. Very obvious features, such as the fact that the "three-holed-form-board" of the Binet and "sequin-form-board" of the Merrill Palmer involve features with the same geometric properties as those the child is unable to draw, have not been brought into focus. According to Binet standards, for example, an average child can fit together equivalent areas quite readily in year two that he cannot represent by drawing until a considerable time afterward. In addition, Gesell points out that children little older than one year are able to match areas (8). It has not been recognized that the forementioned form board problems are solved most directly by matching "inside" areas with "outside" areas or holes, but that following contours is necessary in cases where tracings are reproduced.

Clark (6) and O'Shea (20) many years ago suggested that inadequate tracings resulted from a lack of imaginative restraint. Enmeshed in the abstractions current in their day, those of the "new psychology," they hypothesized that the child attended to associations produced by elements of sensation and not to the elementary sense data itself. They may have been partially right, however. It is possible that the crucial factor in successful portrayal may be that of attending to features of stimulation that can be expressed as lines on a two-dimensional surface. It should be recognized that representing what is seen as shape with a contour is quite a difficult abstractive process since contour is not identical with shape (25). Once contour becomes recognized to be of critical importance and the child learns to "follow" contour, the perceptual foundation of adequate performance would seem to have been laid.

If what has been said is in essence accurate, one may well begin to understand how it is that the perceptual-motor appreciation of tracings occurs in a hierarchy of difficulty. (That is, that "circles" are easier than "squares," and "diamonds" more difficult than both.) Our data and, indirectly, that of others (12) imply that older normals deal with such tracings as self-contained symbols. On the other hand, our results and others (1, 13, 17, 19, 20) point out that younger normals are likely to see the tracings as symbolic of an object or class of objects. Sully (21) long ago pointed out that perceptual-motor performance of the child is not an imitative representation but a linear description of what is known about the object in reference. Coupling this feature with the discovered preference for perceiving shapes suggests perceptual-motor difficulties of a rather definite and hierarchical character. Thus, the older person attends to the contour, recognizes it as sheer symbol, and reproduces the symbol. For the young child, the tracing does not exist for itself. When called upon to reproduce the tracing, he must treat it as an example of a literal circumstance. By tracing, the young child attempts to portray the shape the area symbolizes to him. In more general terms, i.e., for three-dimensional as well as two-dimensional objects, one would say the child attempts a perceptual-motor appreciation of surface or surfaces by the tracings.

It is not, however, possible for a child or anyone, for that matter, to represent a surface as flat copy without taking into account its orientation to the observer. As Gibson (9) points out, a concrete shape without some "slant" is simply unperceivable. Now, it is not that the child "wants to" represent orientation "consciously" and fails, but rather that perceptual-motor behavior *must* take into account the orientation of the object the tracing suggests if it is to be successful. In light of what has been said, the "circle" tracing becomes most easy since a portrayal of the "roundness" of objects, such as a ball, is always there from any orientation. The square is somewhat more demanding, for "block" and "windows" do necessitate dealing with orientation. Nonetheless, a "square" is not exceedingly difficult because as a "block," "squareness" is a feature of many orientations, and, as a "window," it occurs frequently at fixed orientations to stable surfaces as a part of a well defined context. The surfaces exemplifying "squareness" and "roundness" are probably much more common than those with the characteristic of "diamondality." Also linked to the difficulty of diamond tracings are the areal features such tracings represent.

The most common verbalized signification of the "diamond" was found to be that of "kite." To reproduce a kite so that it appears as a geometric diamond when a tracing requires perceptual-motor conceptualization of a much more complex order than the child of five is capable of. What this would amount to perspectively is shown in A of Figure 5. This is accompanied by actual reproductions of unacceptable response interpretable as inadequate attempts to resolve the diamond as a "kite." Another objectification might possibly entail identifying each of the acute angles of the standard tracing with some area bounded by converging contours. Such an objectification was not actually verbalized by our subjects, but will be considered, nevertheless, for several reasons. One, it is unlikely that a young child can adequately express such an objectification; two, not every feature affecting perceptual-motor performance can be epitomized at the phenomenal level; three, some children gave no identifiable objectification; and four, much of the data here and elsewhere suggest this alternative. If this were the case, the tracing would be difficult to draw because the upper surface would have a reference separate from the lower. Since it is unlikely that many of the imitable objects the child would encounter would display both a convergence and its mirror image, difficulty should occur with the obtuse angles. Difficulty commonly does occur here. Instances in which joining of separate

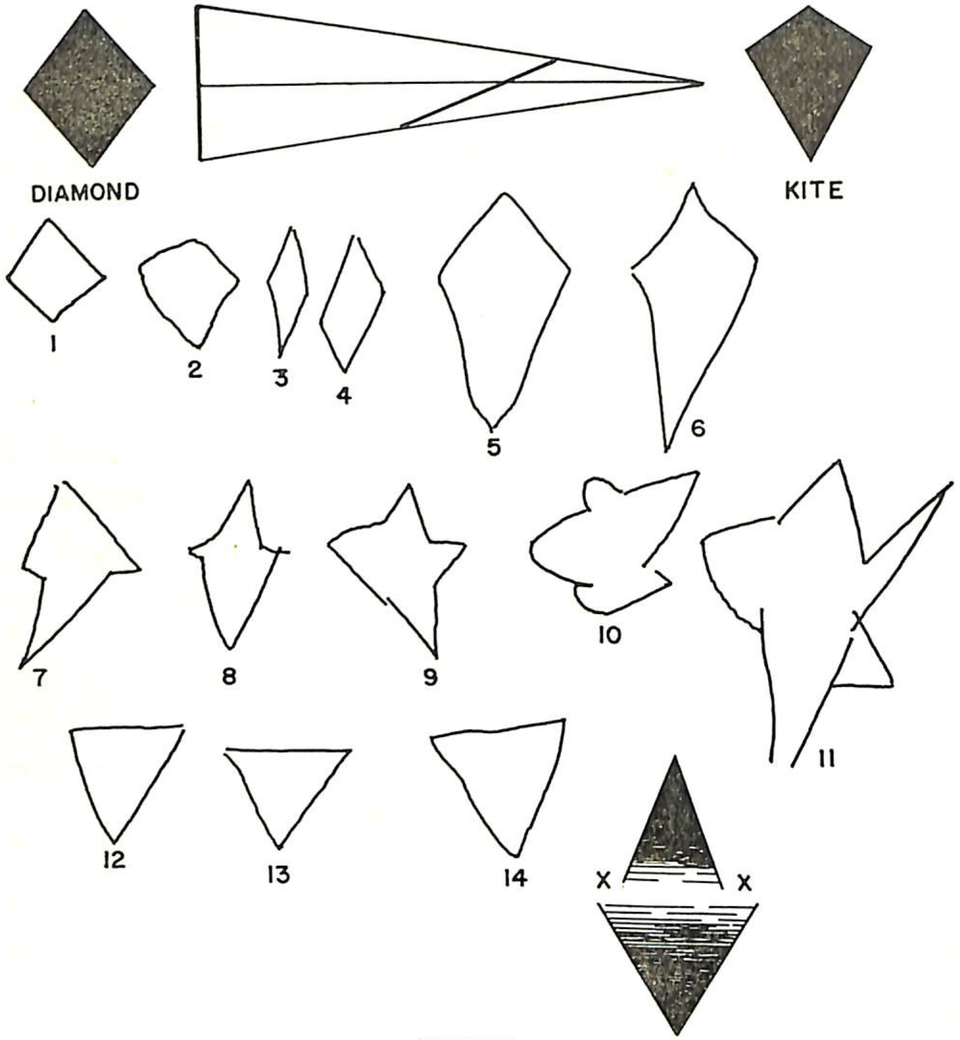

FIGURE 5
Drawings of subjects' and authors' schemas. Top schema indicates that a diamond and a kite may subtend the same set of visual angles, hence a kite may be oriented to be a diamond, and a diamond may be oriented to be a kite. Drawings 1 to 6 inclusive, referred to in the text as A, show the kite. Drawings 7 to 11 inclusive indicate a kind of difficulty of getting two portions of the drawing to join, hence the "ears." The issue involved is shown in the schema in which the two parts seem to be drawn in different scales, and the parts to be joined involve the use of lines running in different directions than any existent in the original flat copy. Drawings 12 to 14 inclusive may indicate cases in which the two areas are not produced, but simply one of the common areas.

converging areas may have been attempted is given in Figure 5. The "ears" are likely produced when the converging areas are joined in a trial and error fashion, or when the child uses trial and error to proceed to taper the other converging area in the opposite direction. The "steps" between the contours would occur when the ends of separately drawn parts are simply connected. In cases in which the child is unable to proceed to the reverse area, he perhaps simply makes the common "triangle response" shown. At any rate, it seems very likely that an acceptable "diamond" tracing depends both upon the ability to follow contour and upon the ability to treat the contour as a sheerly stylized symbol peculiar to flat copy.

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The Journal of Genetic Psychology, 1962, **100**, 309-312.

ADMISSION TESTING PROGRAM*

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A. Selecting the Test Battery

As the admission rate to hospitals for psychiatric patients continues to increase, shortages in various personnel categories, including clinical psychology, have become more pronounced. Furthermore, as the psychologist continues to fill a broader role in the treatment and research programs of the hospital, his time for other activities becomes more limited. Hence, his important role in personality evaluation is often curtailed. The psychologist-patient ratio will generally be so insufficient in most hospitals that the burden of selecting and screening patients for psychological evaluation often becomes difficult for the ward physician or psychiatrist.

There is no real substitute for individual psychological evaluation. However, we have wondered whether some method could be found whereby certain individual procedures might be administered to a number of patients at one time and still retain their usefulness as individual procedures? Other psychologists have found several already established techniques adaptable for group testing, such as Bender's Visual Motor Gestalt Test, House-Tree-Person, Sentence Completion, as well as short measures of intelligence.

After extensive exploration of the use of group testing programs, including careful surveying of the experiences of others, the Admissions Testing Program at the Veterans Administration Hospital, Waco, Texas, was begun in May, 1952. The program has been carried on as an integral part of the hospital admission procedures, with the active cooperation of the Director of Professional Services and the participation of the Chief of the Acute Intensive Treatment Service and his medical staff over a seven-year period. It is felt that the experiences of this hospital over this period of time may be of help to others faced with similar problems in evaluation.

In developing a battery of psychological tests for group administration several factors must be considered. The nature of the population to be evaluated is of paramount importance. In the case of psychiatric patients, many are quite disturbed, particularly on first admission to the hospital. Great tact must be exercised by the psychologist in order to secure the

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* Received in the Editorial Office on May 23, 1960.

cooperation without which test results become meaningless. The positive attitude of the medical and nursing staffs in discussing the Testing Program with patients has helped point out to patients the relationship between test-taking and obtaining maximum benefit from hospitalization. Priority in scheduling for the program has also aided in helping the patient to understand the importance of the program.

The initial selecting of tests comprising the battery was carried on by the various staff psychologists with the goal of gaining maximum understanding of the patient. The staff considered such factors as selecting material that would reveal clinical data as rich as possible, be adaptable to group administration, and be of reasonable time duration.

After considerable planning and consultation, the following areas of appraisal were selected: (*a*) behavioral observation; (*b*) evaluation of mental functioning, including estimation of the intellectual level, concept formation, and areas of impairment in thinking and perception; (*c*) salient features of the personality and dynamics; (*d*) attitudes and conflicts; (*e*) personality disturbances leading to psychodiagnostic impression; and (*f*) recommendations for treatment and/or planning where possible.

Tests selected for the battery were: Kent E-G-Y Oral Emergency, an original Picture Completion Test, Visual Motor Gestalt, Draw-A-Person, and the Rotter Sentence Completion.

B. ADMINISTRATION

To allow for adequate observation and test administration the groups are kept small, preferably between six to 15 persons to a group. The group administration is conducted by an experienced staff psychologist. The larger groups require a second staff member to allow for the frequent individual guidance and assistance required. Oftentimes, the second member may be a psychology trainee or other staff member in a "learning" role.

At this hospital, it has been found possible to include almost all admitted patients in the program. Excluded would be patients seriously disturbed, physically ill, or unable to read and write. Many of the latter are able to participate in the program in part. In order to help those unable to communicate well in English, a Spanish interpreter has been assigned to the program. Often patients are able to participate when verbal questions can be literally translated or limited assistance given.

C. INTERPRETATION

Of course, the psychologist's approach to group test interpretation is the same as that towards individual evaluative material. In both cases, a battery of test information is available for analysis and interpretation. The patient reveals himself, his characteristic mode of behavior, dominant drives, needs, sentiments, attitudes, fantasies, conflicts and defenses in his responses to test material. What is the usual emotional expression and how is it controlled? What is the amount and quality of the patient's ideational activity? Is anxiety present and how is it being handled? What is the source of anxiety, the unresolved conflict. How does the patient handle environment forces? How severe does the pathology appear?

Looking at some of the test items in detail as a sample, one can evaluate the formal and stereotyped thinking as revealed by the patients' responses on the Kent. This phase of the mental life may be quite intact and thus gloss over more severe personality disturbances. It appears that the intellectual and early acquired material is the last to be affected by pathology. For example, on one of the neutral questions on the Kent: *What are houses made of?* a patient may name several general materials that he knows, revealing adequate reasoning and retention of memory processes. On the other hand, if a patient states that houses are made of boards, 2 × 4's, 2 × 6's, and shingles (all lumber), it is very likely that inroads have already been made into his ability to do abstract reasoning. Patterns in the test battery will usually substantiate this initial observation.

The Picture Completion Test consists of nine incomplete pictures on cardboard, 9 × 14 inches, which are held in front of the patients who are instructed to write down the missing part or "what appears to be missing" in each picture. This is a test of our own improvising and was designed as a measure of reality testing. In fact, it has been rich in producing much projective material and calls into service all of the psychologists' background in interpreting projective tests. How much do unconscious impulses intrude upon objective reality? What are these impulses and how can they be detected or inferred? As an example, let's take the profile picture of the head of a man with the bridge of the nose missing (a castration symbol?). Children and regressed psychotics often state that the body or arms and legs are missing. Regression would usually be found in patients answering in this manner. Some patients who are less regressed but whose perceptual functioning has been impaired may state that "the other eye—(suspiciousness?) is missing (the one on the other side of the profile)," or that the hair (virility?) is not shown, or that the sideburn (masculine striving?) is absent. These can be treated symbolically and will ordinarily fall into a personality pattern of conflicts repeated over and over throughout the battery of tests.

The Visual Motor Gestalt Test gives an overall appraisal of personality integration and ego strength. The level of functioning can be fairly well ascertained by the patient's performance on this instrument. Frequently, conflicts are expressed symbolically through these figures, with certain parts receiving preferential treatment over other details as they become associated with problem conflicts and former figures of the patient's past.

The Body Image (the inner self) is frequently seen through the patient's drawings of human figures, the man and woman. Too, the level of adaptation is also reflected here with many of the patient's needs and his usual method of meeting them being projected in the drawings. The global aspects of the figures and their relationship to each other are most important in assessment of the personality. One should be cognizant of the various levels of functioning, recognizing the favorable and potential aspects of adjustment as well as conflict areas.

Rounding out the battery, the Sentence Completion Test often reveals material or content of which the patient is aware. His presenting symptoms and other defensive modes of adjustment are usually encountered in this instrument, thus reflecting the manner in which the various levels of personality relate and mesh in the ultimate development of the psychopathology.

The Admissions Testing Program is not a substitute for individual psychological evaluation. In fact, the program points out best the doubtful cases where individual evaluation would be the most effective. Through the program, the psychologist becomes acquainted with all hospital patients and is able to carry out individual evaluation where he can most contribute to the understanding of the patient. In addition, the psychologist is able to make a significant contribution towards diagnostic understanding and planning with every patient. Reactions to the seven-year period with the program have been highly favorable, establishing the program in the hospital.

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The Journal of Genetic Psychology, 1962, **100**, 313-323.

PERSONALITY CHARACTERISTICS OF FRESHMAN MEDICAL STUDENTS AS DEPICTED BY THE LEARY SYSTEM*[1]

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Although various writers (15) have emphasized the role of the physician as a therapeutic agent in our society, the literature contains few studies dealing with the personality characteristics of the medical students who later fill this role. The major research efforts thus far with medical students have focused on the development of criteria for predicting success in medical school (3, 5, 6, 13). Various measures have been used for this purpose but none have adequately predicted those students most likely to succeed in medical school. Selection procedures, which attempt to assess both intellectual functioning and nonintellectual aspects of the student's personality, can predict with a high degree of confidence whether or not an applicant has the intellectual capacity to graduate from medical school. However, since students often fail or drop out for reasons quite unrelated to basic intelligence, more attention is currently being given the role which emotional disturbances play in medical school success (9, 20) and the personality factors creating these disturbances have become a source of concern for medical faculties throughout the country (16).

In view of this concern, the question legitimately arises as to whether medical students as a group differ significantly from the general population in personality attributes. Shaffer and Kuder (18) found that the interests of physicians were significantly different from the interests of lawyers and businessmen. Physicians were higher on social service, scientific, artistic, and outdoor interests, but were lower on computational, persuasive, and clerical interests. Schofield (17), however, failed to find any basic personality patterns which would differentiate medical students from other samples of male college students in his studies with the MMPI. The paucity of studies in the literature point up the need for further research in this area.

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* Received in the Editorial Office on May 24, 1960.

[1] The author is indebted to Dr. M. D. Gynther, staff psychologist, South Carolina State Hospital, Columbia, S.C., for his invaluable assistance in the preparation of this manuscript.

One aspect of personality which has been relatively unexplored is the mode of behavior which medical students characteristically use to handle interpersonal situations. This is somewhat surprising, since many practitioners feel that the physician-patient relationship is the crucial variable in the treatment of patients. In notable studies, Stern, Stein, and Bloom (19) as well as Parker (14) studied the relationship between selected personality characteristics of medical students and the types of relationships they sustained with patients. These investigators found that students with "authoritarian personalities" were disinclined to be "person-oriented" in personal relationships. Other findings were that these authoritarian medical students had more hostile feelings than the nonauthoritarian students, and the authoritarian students had little emotional involvement in personal relationships. Since physicians constantly interact with patients, it would be desirable to obtain more information as to how the students perceive themselves as well as important "others" in their environment.

Leary's Interpersonal System of Personality (10, 11), a relatively new assessment technique, appears to be ideally suited to an investigation of this problem. Leary (10) summarizes its principal features as follows:

> This system is objective, employing reliable ratings of units of behavior which are then manipulated by standardized statistical methods. The system is interpersonal since it selects for analysis those aspects of personality which concern a subject's relationship to others. The system is multilevel in that it studies how a person acts with others, how he describes his actions with others, how he fantasies his actions with others, how he idealizes his actions with others. The system is functional—since it is aimed at predicting interpersonal behavior in specified, crucial situations, particularly in psychotherapy.

The present investigation is primarily research-oriented but the results should be helpful in the selection of students for entrance to medical school or for counseling purposes. To summarize, then, the purposes of this study are to determine the following aspects of the interpersonal behavior of medical students: (*a*) the way they appear to others; (*b*) how they describe themselves; (*c*) their underlying character structure; (*d*) their perceptions of mother, father, spouse, and ideal; (*e*) their self-actualization and conscious self-acceptance; and (*f*) their tendency to use self-deception.

B. METHOD

1. *Subjects*

The subjects for this study consisted of 64 freshmen (class of '62) medical students at the Medical College of South Carolina. The ages of these 60 male and four female students ranged from 20 to 33 with a mean age of 23.5 years. Thirty-one of the students were married while 33 of the students were single (including the four female students).

2. *Instruments*

The Minnesota Multiphasic Personality Inventory (MMPI) and Interpersonal Check List (ICL) were used to measure various levels of behavior assessed by the Leary system. The MMPI, according to Leary (10), measures the way a person acts with others[2] (public interpersonal behavior—Level I-S) and the underlying character structure (Level III-MM), the ICL measures conscious self-description and description of others (Level II), and the Ideal rating (Level V).

A set of interpersonal variables, listed in a circular continuum, is used to categorize behavior at all levels. This circle is conceived as a two-dimensional grid with the vertical axis measuring dominance-submissiveness and the horizontal axis measuring love-hate. The center of the circle represents the mean of the normative population. The distance and direction of the subject's summary scores from the center reflects the particular kind of interpersonal behavior and its degree of deviation from the norm. The circle is divided into octants, starting with one at the top and proceeding in a counterclockwise direction through eight. As the results will be presented by octants, the interpersonal variables to which each refers will be given now, the adaptive diagnostic category appearing first, the maladaptive diagnostic category second: Octant 1, managerial-autocratic; Octant 2, competitive-narcissistic; Octant 3, critical-sadistic; Octant 4, skeptical-distrustful; Octant 5, self-effacing-masochistic; Octant 6, docile-dependent; Octant 7, cooperative-overconventional; and Octant 8, responsible-over generous.

The public interpersonal diagnosis (Level I-S) is obtained by substituting the appropriate MMPI T-scores in the following arithmetical formulae: $\text{Dom} = (\text{Ma-D}) + (\text{Hs-Pt})$ and $\text{Lov} = (\text{K-F}) + (\text{Hy-Sc})$. These "raw score" indicators are converted into standard scores by reference to a table given in the Manual (1956). The standard scores were then used to plot the location of the summary point in one of the octants on the diagnostic grid.

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[2] The validity of Leary's interpretation of MMPI profiles has not been definitely established. However, a study currently in progress shows that if analysis of an MMPI profile predicts that an individual will behave in a managerial, responsible, or friendly manner, pooled ratings by others will be in agreement nearly 80 per cent of the time.

The underlying character structure (Level III-MM) diagnosis was determined by the intersection of the MF and Pd T-scores on a special diagnostic grid. The diagnoses of conscious self-description and description of others (Level II), as well as description of ideal (Level V), were obtained by substituting the total ICL scores for each octant into arithmetical formulae and converting the results to standard scores which were then plotted on the diagnostic grid to obtain the octant.

After octants are obtained for each subject's different levels of behavior, variability indices are determined. These indices are interlevel relationships and reflect the amount of discrepancy between (*a*) different diagnostic levels; (*b*) self-diagnostic and ratings of others; and (*c*) the conscious ideal and ratings of self or others. The 14 possible discrepancy scores range at unequal intervals from 0 to 114. No conflict is considered to be present when the discrepancy between two measures, e.g., self-diagnosis and ideal, is one octant or less. A discrepancy score of more than 44 indicates a difference of more than one octant between ratings which defines a significant degree of conflict. The maximum score of 114 shows that the ratings fall in opposite octants, i.e., 1 and 5, 3 and 7, and so forth.

3. *Procedure*

The tests were administered to the students individually as different schedules prohibited group testing. During the administration, the students were asked to rate self, mother, father, spouse, and ideal on the ICL. In the event either parent had died recently, the student rated this parent as he was remembered. In cases where the student was reared by an aunt or uncle, these parent-surrogates were rated as parents. In describing an ideal, the subjects are instructed not to choose an admired family member or friend but a generalized ideal.

C. RESULTS

The results of this study are presented in three tables. Examination of Table 1, which shows the distributions of octant ratings obtained from the medical students for the different diagnostic levels, indicates that more than three-fourths of these students impress others as managerial and responsible (Octant 1 or 8). Similar to these results are those dealing with the group's self-description, except that at this level competitiveness (Octant 2) is much more emphasized. It is interesting to note that although one-fourth of the students described themselves as competitive, only 3 per cent actually impress others as competitive. In other words, these students are really much more generous and much less striving than they perceive themselves to be. The ratings of underlying character structure show a marked similarity to the group's self-descriptions; i.e., 62 per cent of the students have underlying managerial or competitive feelings. However, the students' ideal ratings show that not all these individuals actually want to be leaders, competitors, or responsible persons. The most frequent ideal (25 per cent) is to be a critical-sadistic person. The next most frequent ideals (16 per cent each) are to be docile-dependent and competitive-narcissistic.

TABLE 1
OCTANT RATINGS OF 64 MEDICAL STUDENTS AT DIFFERENT LEVELS OF BEHAVIOR (IN PER CENT)

Octants	Interpersonal diagnostic category	Levels* I-S	II-S	III-MM	V-Id
1	Managerial-autocratic	39	37	39	6
2	Competitive-narcissistic	3	27	23	16
3	Critical-sadistic	5	12	8	25
4	Skeptical-distrustful	1	5	3	9
5	Self-effacing-masochistic	0	1	3	12
6	Docile-dependent	3	1	1	16
7	Cooperative-overconventional	3	5	5	8
8	Responsible-overgenerous	46	12	18	8

* Level I-S refers to the subject's public interpersonal behavior, II-S to his private self-description, III-MM to his underlying character structure, and V-Id to his conscious ideal.

By further dividing the ideal results into two subgroups—competitive-critical (Octants 2 and 3) and self-effacing-dependent (Octants 5 and 6)—other interesting results are seen. The students who would like to be competitive and critical also appear to be this way at the characterological level (III-MM), while none of the students who would like to be self-effacing or dependent fall in the same octants at the characterological level. Students who fall in the narcissistic-critical category at both the characterological and ideal levels would appear to be more consistent and well-integrated, whereas those students with self-effacing-dependent ideals usually reveal managerial character traits which suggests conflict and potentialities for poor adjustment. Support for this hypothesis is given by the fact that three times as many of the students who claim they wish to be narcissistic and selfish demonstrate narcissistic-selfish character traits, whereas five times as many of the students in the self-effacing-dependent group fall in the responsible-generous category at the characterological level.

Inspection of Table 2, which presents the distribution of octant ratings by the medical students of their mothers, fathers, and spouses, demonstrates that nearly one-half (42 per cent) of these students rated their mothers as possessing leadership qualities. Fathers were also rated positively, but differences exist between these results and those involving mothers. For example, 36 per cent of the fathers were rated as competitive as compared to only 13 per cent of the mothers, whereas twice as many mothers were seen as generous and friendly (Octants 7 and 8). Another interesting difference is that only 3 per cent of the fathers were rated as critical, skeptical, self-effacing or docile while 13 per cent of the mothers were given these ratings. Somewhat in contrast to the mothers are the ratings of the spouses. Generally, the spouses are perceived as more responsible and cooperative than the mothers. One noteworthy feature is that of the two spouses rated as critical-sadistic (Octant 3), one is a registered nurse and the other is an M.D. (competitors?).

TABLE 2

Octant Ratings of Medical Students' Mothers (II-M), Fathers (II-F), and Spouses (II-Sp) (in Per Cent)

Octant	Interpersonal diagnostic category	II-M	II-F	II-Sp
1	Managerial-autocratic	42	44	26
2	Competitive-narcissistic	13	36	12
3	Critical-sadistic	6	3	6
4	Skeptical-distrustful	1	0	0
5	Self-effacing-masochistic	5	0	0
6	Docile-dependent	1	0	0
7	Cooperative-overconventional	12	5	20
8	Responsible-overgenerous	20	12	36

Table 3-A gives the distribution of discrepancy scores obtained by the students on self-deception and other variability indices. As stated earlier, a low score means that the ratings being compared are very similar, whereas a high score indicates that the ratings being compared are dissimilar. Scores above 44 indicate that the ratings are significantly different. Examination of this table shows that slightly over one-third (37 per cent) of these students misperceive their public interpersonal impact. Most of these misperceptions were in an unfavorable direction; i.e., students describe their behavior as hostile, competitive, or skeptical, whereas their interpersonal stimulus value is friendly or managerial. Also, three-fifths of the students have significantly low self-actualization scores which means that their symptomatic managerial and responsible qualities are quite different from the hostility or docility they idealize. In other words, 60 per cent of these students are not acting in ways in which they would like to act. Finally, two-thirds of these students reject themselves at the conscious level, demonstrating the conflicts which exist between what they yearn to be and what they perceive they are really like.

Table 3-B shows the distribution of discrepancy scores for the conscious identification indices. Any discrepancy score greater than 44 is indicative of significant dissimilarity between the two ratings being compared. Inspection of these data demonstrates that the majority of these medical students are consciously identified with their parents and spouses; i.e., approximately two-thirds of the students describe their behavior as being similar to that of these important "others."

TABLE 3

Variability Indices of Medical Students (in Per Cent)

Verbal definitions of indices*	Amount of discrepancy													
	00	23	26	41	44	48	62	66	68	81	84	91	105	114
A. Interlevel conflict														
Self-deception	17	9	3	11	23	2	0	11	0	16	3	2	3	0
Self-actualization	14	3	3	8	12	2	0	19	5	17	8	3	6	0
Conscious self-acceptance	3	2	3	9	15	0	2	11	3	11	8	3	21	9
B. Identification with others														
Father	13	8	5	23	23	0	0	5	2	8	5	0	8	0
Mother	30	9	2	5	23	3	3	9	0	11	0	2	3	0
Spouse	22	16	3	10	16	0	0	7	3	13	0	0	10	0
C. Idealization of others														
Father	12	3	0	6	16	0	5	8	0	22	11	6	6	5
Mother	6	8	0	6	18	2	5	12	0	12	9	2	15	5
Spouse	6	10	3	6	16	0	0	10	0	10	10	10	16	3
D. Perceived similarity between others														
Mother-father	20	6	2	11	30	0	0	3	2	16	5	3	2	0
Mother-spouse	32	10	3	10	20	3	0	3	0	10	3	3	3	0
Father-spouse	25	3	3	10	20	3	0	7	0	22	0	0	7	0

* Operational definitions of these indices are given in the Manual.

Table 3-C presents the distribution of discrepancy scores for the idealization indices. Examination of these findings indicates that the majority of the students devaluate both their parents and spouses; i.e., most describe their ideal as being quite different from their parents and spouses. This result seems to be due to the difference between the wished-for hostile or docile role and the responsible, managerial qualities ascribed to these important "others."

Table 3-D shows the distribution of discrepancy scores on the equation indices. Inspection of these findings demonstrates that parents and spouses are viewed, by most of these students, as very much alike. As all these family figures were described primarily as responsible, managerial, competitive persons, this similarity of perceptions is not surprising.

D. Discussion

To differentiate the personality configurations of these medical students from those of other normal or outpatient samples, it will be necessary to compare these results with other pertinent findings obtained by the Leary system. Striking contrasts are evident when the medical students' "façade" scores (Level I-S) are compared with those of Leary's normal group (i.e., male graduate students) which most closely resembles the medical students. If these data are translated into percentages, it can be seen that seven times as many of the graduate students are rated as competitive-narcissistic (Octant 2) and 13 times as many of this group are rated as skeptical-distrustful (Octant 4) than the medical students.

Comparison of the medical students with one of Leary's largest diagnostic groups (i.e., university students attending the outpatient clinic) also yields marked differences. Twice as many of the medical students are seen as responsible (Octant 8) and three times as many are seen as managerial (Octant 1) as the outpatient group, while 17 times as many of the outpatient group were rated as skeptical-distrustful (Octant 4) and 13 times as many of this group were rated as self-effacing-masochistic (Octant 5). At this level, then, medical students generally appear as responsible and managerial in contrast to the more competitive and distrustful university graduate students and the critical, hostile, dependent student outpatients.

The octant scores obtained from analysis of MMPI profiles may be combined in order to compare "healthy" symptomatic behavior (i.e., Octants 2, 1, 7, 8) with "neurotic" symptomatic behavior (i.e., Octants 3, 4, 5, 6). If this is done, it will be seen that 91 per cent of the medical students present "healthy" public interpersonal façades. Although this percentage exceeds the similar figure for the university male graduate students (82 per cent), it is somewhat lower than a military officers sample (97 per cent) (10). It is interesting to note, also, that this figure is somewhat lower than the "healthy" façade scores found in a large sample of student nurses (7, 8). This difference is seen mainly in Octant 1 where a larger percentage of both student nurses and military officers impress others as managerial than do medical students. This is surprising, as physicians would seem to be the example *par excellence* of the responsible authority figure in this culture. Perhaps the high percentage of student nurses' and military officers' managerial ratings reflect their over-concern with power and leadership.

In comparison with the student nurses at the level of underlying character structure (Level III-MM), over three times as many student nurses (21 per cent) fall in the subgroup of Octants 6 and 7 as do the medical students (6 per cent). Characterologically, then, student nurses seem to be much more dependent and cooperative than the medical students. At this same level, comparison with a small sample of another professional group, ministers, yields interesting results. If the diagnostic circle is divided into the "strong" octants (i.e., 8, 1, 2, 3) and "weak" octants (i.e., 4, 5, 6, 7), over three times as many ministers (40 per cent) fall in the "weak" octants as do the medical students (12 per cent), thus giving evidence of more underlying characterological submissiveness and passivity on the part of the ministers.

The large percentage of students showing "healthy" symptomatic behavior at both façade and characterological levels indicates that in interpersonal situations, such as the physician-patient relationship, these future physicians would tend to act in a way to inspire confidence in their patients. Interpersonal relations have become increasingly recognized, not only as important in achieving more therapeutic effects with drugs, but also in the management of many disease entities (1), in handling preoperative patients (2), and especially in dealing with cancer patients (4). A recent study by Wolff (21) indicates that about one-third of the effectiveness of many modern drugs still depends upon the personality of the physician. Wolff also found that if a patient desperately wants relief and trusts his physician, he may get as much relief from a placebo as from the real drug.

One surprising finding is the large number of students who would *ideally* employ "neurotic" behavior in interpersonal situations. It will be noted that 62 per cent of the students indicate that they would like to be either hostile, skeptical, dependent, or docile in dealing with people, and that 40 per cent of this subgroup fall in Octant 3 alone (critical-sadistic). This surpasses the figures found in a similar study of alcoholics (7), a supposedly abnormal group. Possibly Menninger (12) shed light on this finding when he pointed out the presence of unconscious psychological factors motivating students to pursue the profession of medicine such as the desire to emulate or surpass the father's occupational status, and sublimation of hostility into socially acceptable channels. No less an authority than Freud also emphasized that surgeons particularly pursue their profession as a means of channeling sublimated hostility into socially rewarding pathways. Another possible explanation is that students are drawn unconsciously to a profession which has for some time enjoyed the status of the most revered and respected of all occupations as a reaction formation against their docile, dependent, or skeptical ego ideals.

E. SUMMARY

The Leary Interpersonal System was used to analyze MMPIs and Interpersonal Check Lists obtained from 64 freshmen medical students. These results were compared with other normative data for the public interpersonal level (I-S) and the level of underlying character structure (III-MM).

A great majority (91 per cent) of these medical students presented healthy, symptomatic behavior and most (81 per cent) described themselves as responsible, generous, managerial persons in interpersonal situations. In the physician-patient relationship, these students would tend to inspire confidence, a highly desirable feature in view of the increasing recognition of the importance of interpersonal relations in various phases of medicine. Comparison of the medical students' "façade" scores with those of other normal and diagnostic groups reveals that responsible and managerial qualities are stressed by the medical students whereas university graduate students emphasize competitiveness and distrustful qualities and student outpatients emphasized critical, hostile, dependent behavior.

Characterologically, most of these students (85 per cent) have underlying managerial, competitive, responsible feelings. In spite of the large percentages of "healthy" behavior at this level and the "façade" level, the most frequent ideal of these students is to be a critical-sadistic person. These interlevel conflicts point to the possibility of future poor adjustment on the part of many of the students. Comparison of the students' characterological scores with those of other groups indicates that these students have more underlying strength (Octants 1 and 2) than either student nurses or ministers, as both of these groups manifest underlying submissiveness and passivity.

This study has demonstrated the usefulness of the Leary system in describing important personality characteristics of medical students. An even wider variety of data can be obtained by this method, and these data can eventually be applied to selection procedures and counseling disturbed students.

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The Journal of Genetic Psychology, 1962, **100**, 325-329.

SEX AS A FACTOR IN DELAYED-RESPONSE AND REDUCED-CUE DISCRIMINATION LEARNING BY PREVIOUSLY IRRADIATED MONKEYS*[1]

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A. Problem

Recent research by McDowell, Brown, and McTee (1) found female rhesus monkeys to be superior to male rhesus monkeys on spatial delayed-response learning performance. The superiority of the female monkeys was attributed to their greater attentiveness, as experimentally demonstrated, rather than to a sex difference in "intellectual" ability.

The present study was conducted to determine if similar sex differences were present in an independent group of monkeys that had previously been exposed to a nuclear radiation. Delayed-response and reduced-cue discrimination tasks were used.

B. Methods

1. *Subjects*

Sixty-four rhesus (Macaca mulatta) monkeys, ranging in age from 30 to 42 months, were employed as *S*s. Fifty-six of the *S*s had been exposed to a nuclear radiation at the Nevada Test Site approximately 14 months before the present investigations were initiated. The number of *S*s of each sex in each subgroup and the radiation dosages for the *S*s of each subgroup are shown in Table 1. For the purposes of the present investigation, the *S*s of the control group and of radiation subgroups I and J constituted Group 1, the *S*s of radiation subgroups F, G, and H constituted Group 2, and the *S*s of radiation subgroups C, D, and E constituted Group 3.

The reason for combining subgroups in this manner was to permit comparison along the radiation dimension of the results of this investigation with the results of the only previous learning study conducted with the same *S*s (2). In the previous study, subgroups were combined in order to meet the requirements of the chi-square test with respect to expected frequencies in each cell.

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* Received in the Editorial Office on May 30, 1960.

[1] This work was conducted at the Radiobiological Laboratory of The University of Texas and the United States Air Force, Austin, Texas, and was supported with funds provided under Contract AF 41(657)-149 and the School of Aviation Medicine.

TABLE 1

DOSE LEVELS FOR AND NUMBER OF *S*s OF EACH SEX IN EACH SUBGROUP

Subgroup	Gamma (r)	Neutron (Rep)	Estimated total dosage (rem)	No. of males	No. of females
C	252	209	670	5	1
D	242	183	608	4	1
E	204	154	512	5	3
F	187	126	439	3	4
G	169	114	397	5	3
H	151	102	355	3	4
I	129	85	299	6	2
J	119	77	273	5	2
Control	0	0	0	4	4
			Total	40	24

2. *Apparatus*

All training of *S*s in this investigation was conducted in a modified version of the Wisconsin General Test Apparatus (WGTA), the holding cage of which measured 36 by 30 by 24 inches. A stimulus tray holding two foodwells, spaced 12 inches apart center-to-center, was used. The stimulus objects for reduced-cue discrimination testing were two yellow-painted square wooden blocks, measuring 3 by 3 by 3/4 inches, and a red-painted circular wooden block, measuring 2 inches in diameter and 3/4 inches in depth. The same two square blocks were used for the delayed-response testing.

3. *Procedure*

a. Reduced-cue discrimination. The *S*s first received reduced-cue discrimination training. Each *S* was given 24 two-trial problems per day for 32 days. Over the course of the 24 problems, the rewarded position was aperiodically, but evenly, varied between the left and right positions.

A reduced-cue discrimination problem was presented in the following manner. The opaque screen of the WGTA was lowered. One piece of diced apple was placed in either the right or left side foodwell according to the predetermined order. The identical square wooden blocks were placed simultaneously over both foodwells. The circular wooden block was then placed on the square wooden block covering the food reward. The one-way vision screen was lowered, the stimulus tray carrier advanced, and the opaque screen raised, allowing the *S* to make a choice.

After the *S* completed the first trial, the stimulus tray carrier was withdrawn, the opaque screen lowered, and the second trial commenced. The *S* was allowed only one choice on each trial. The second trial was similar to the first with the exception that the circular wooden block was not used as a cue. The correct response on the second trial of each problem was to the position which had been rewarded on the first trial.

b. Delayed-response. After completion of the reduced-cue discrimination training, each *S* was tested on 24 delayed-response problems per day for 24 days. Over the course of the 24 problems, rewarded position was aperiodically, but evenly, varied between the left and right positions.

A 10-second spatial delayed-response trial was presented in the following manner. With the opaque screen of the WGTA raised, the attention of the *S* was drawn to the food reward and the food reward was placed in either the right or left side foodwell according to the predetermined order. The identical square wooden blocks were then placed simultaneously over both foodwells. After a 10-second delay, the stimulus tray carrier was advanced and the *S* allowed to make a choice. After the *S* completed the first trial, the stimulus tray carrier was withdrawn and the second trial commenced. The *S* was allowed only one choice on each trial.

C. RESULTS

a. Reduced-cue discrimination. Figure 1 shows the per cent of errors for each sex, based on the mean of the means of each radiation group, on successive 4-day periods of reduced-cue discrimination training. Statistical analysis of the error data, using a mixed type non-orthogonal analysis of variance design,[2] yielded a practice effect which was beyond the .001 significance level. Considered separately the practice effect for each sex was also significant beyond the .001 level. The sex by practice interaction was significant beyond the .005 level, with the female *S*s improving more rapidly than the male *S*s.

b. Delayed response. Figure 2 shows the per cent of errors for each sex, based on the mean of the means of each radiation group, on successive 4-day periods of delayed-response training. Statistical analysis of the error data, again using a mixed type non-orthogonal analysis of variance design, yielded a difference between sexes which was beyond the .05 significance level and a practice effect which was beyond the .001 significance level. The female *S*s were superior to the male *S*s, although rate of improvement with practice did not differentiate the sexes.

D. DISCUSSION

The results of the present study demonstrate the replicability of the earlier reported findings by McDowell, Brown, and McTee (1) con-

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[2] The authors are indebted to R. C. McNee, Department of Biometrics, School of Aviation Medicine, Brooks Air Force Base for this design.

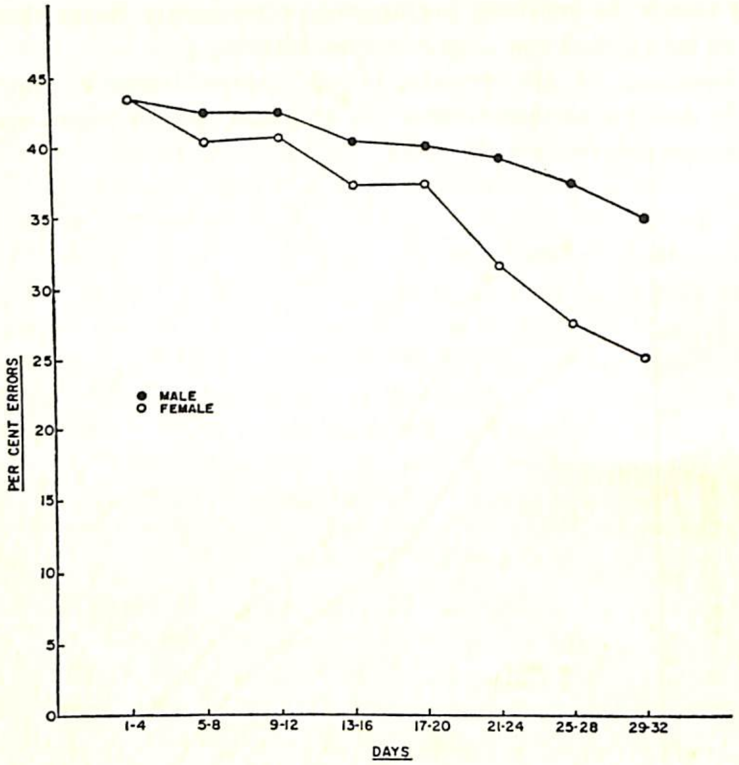

FIGURE 1
PER CENT OF ERRORS FOR EACH SEX ON SUCCESSIVE 4-DAY PERIODS OF REDUCED-CUE DISCRIMINATION TRAINING

cerning the superiority of female rhesus monkeys over male rhesus monkeys on spatial delayed-response performance. The results, also, show a difference of a similar nature on reduced-cue discrimination performance, a task incorporating elements of both object quality discrimination and delayed-response problems.

These results provide added evidence for the need to evaluate the sex factor before generalization of the results of any learning study involving monkeys of both sexes.

E. SUMMARY

Forty male and 24 female rhesus monkeys, ranging in age from 30 to 42 months, that had previously been exposed to varying dosages of nuclear radiation, were compared with respect to learning performance on delayed-response and reduced-cue discrimination tasks. Statistical analysis of the error data, using a mixed type non-orthogonal analysis of variance design, yielded the following results:

1. The female *S*s improved performance significantly faster than did the the male *S*s on reduced-cue discrimination learning.
2. Performance of the female *S*s on delayed-response training was significantly superior to that of male *S*s, although rate of improvement with practice did not differentiate the sexes.

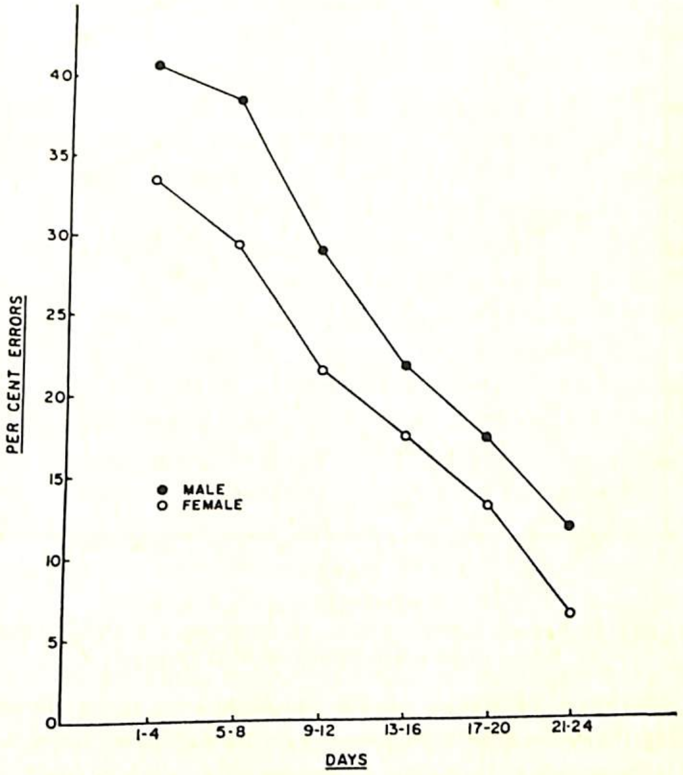

FIGURE 2
PER CENT OF ERRORS FOR EACH SEX ON SUCCESSIVE 4-DAY PERIODS OF DELAYED-RESPONSE TRAINING

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The Journal of Genetic Psychology, 1962, **100**, 331-335.

PAVLOV AND HIS DOG*

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Every undergraduate student of psychology knows the famous story of the Pavlovian Dog, firmly harnessed in leather straps, a little glass tube fastened to its mouth for the purpose of collecting its saliva, and above it a bell. What follows now is like a play on the stage, enacted in three acts under the stage-managership of the experimenter in an adjoining room.

The bell rings. The dog takes no notice of it whatever. The saliva in the glass tube does not rise by one millimeter more rapidly than otherwise. After this fact has been established, we prepare to witness the second act: the period of training. The dog is given food—and every time it is given food, the bell rings. Now there is work to do, viz., to measure the level of saliva in the glass tube. For, each time the dog sees the food, this is accompanied by increased secretion of saliva. Also after this process is completed, the third and last act begins. Here, the author has taken things easy, for the third act is exactly like the first, but the dog's behavior is different; he obviously pays attention to the bell, for every time it rings, he begins to salivate, just as if—anthropomorphically spoken—he "expected" to be given food.

This is the story. Were one to translate it into psychological technical language, it would run as follows: a number of inherited responses are given; here it is the increased secretion of saliva at the sight of food. Food is the inherited stimulus for this inherited response. Stimuli of this kind are called "unconditioned stimuli," and responses of this kind "unconditioned responses." Also a large number of random stimuli are given, which act upon the various senses of the subject from the outside; however the dog takes no notice, i.e., we find no response to these stimuli in the animal's behavior. Such a stimulus is e.g., the bell in the first act of our play. Let us call stimuli of this kind "neutral stimuli."

Now follows the interesting end to this story: Exactly the same neutral stimulus (the bell) has lost its neutrality in the third act. It has, again anthropomorphically speaking, become a signal-stimulus for food. The interlying process, i.e., what takes place in act 2, is the so-called conditional

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* Received in the Editorial Office on June 6, 1960.

learning: Stimuli, which at first produce no effect upon the animal's behavior (and are thus neutral stimuli), *become effective stimuli as soon as they occur more frequently in close temporal connection with already effective stimuli* (here the unconditioned stimuli).

This learning mechanism is, as will be readily admitted, of the greatest biological importance for every kind of living being. A sheep, e.g., that does not run away before feeling the wolf's teeth in its wool, has little chance of surviving. As, however, the wolf's teeth approach the sheep every time amidst a whole cloud of neutral stimuli (scent propagated by wind, the picture of the wolf in the eye, restlessness of other animals, etc.), it is able to respond already to these (absolutely non-dangerous) "signals" and to run away as soon as it notices them. The same applies vice versa to the easier finding of vitally important objects.

What we find in the learning mechanism described is thus the mysterious connection between neutral stimuli and unconditioned responses. We know of the origin of this connection that two conditions are essential: 1. a temporal relationship to an already effective stimulus, 2. repetition. The following therefore holds: A "conditioned response" (see second act of the play) is produced whenever a neutral stimulus is coupled frequently and as a technical simplification simultaneously with an "unconditioned stimulus."

These are, however, exactly the conditions under which it is possible to build an imitation model, one might say an "artificial Pavlovian Dog." For this purpose we mount two keys upon a board (Figure 1). One of them

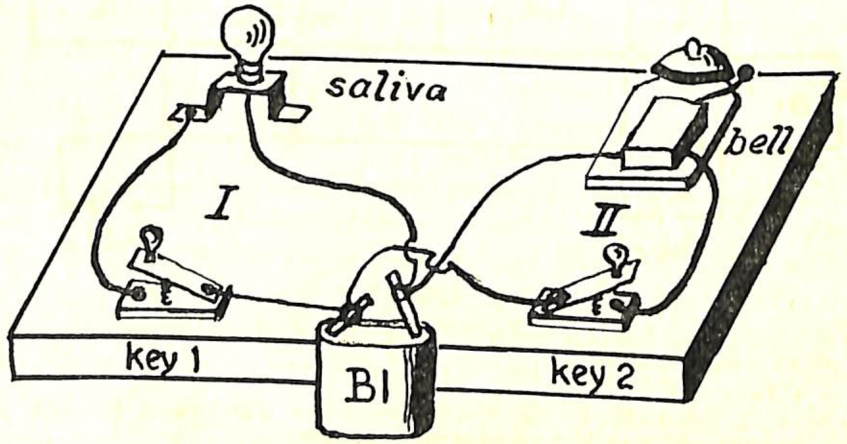

FIGURE 1
Pavlovian Model A

switches a lamp on and off, and the other does the same with a bell. The first system (I) is intended to symbolize the unconditioned stimulus and the unconditioned response. Thus, pressing down key 1 means that "the dog is being given food"; the flashing of the lamp is intended to show that "the dog is beginning to salivate." The lamp is connected with key 1 by means of a battery B1, this happens every time the key is pressed down. The second system (II) is Pavlov's bell. It too rings every time the experimenter presses down the corresponding key 2; however, the ringing of the bell is, at first, not related to system I. In other words, the ringing of the bell in no way influences the flow of saliva.

The question now arises of how to establish a connection between these two systems that exactly imitates the story of Pavlov and his dog.

The solution of the problem is the following Figure 2: Let us arrange for a "brain" to be built in between the two systems, which must have the

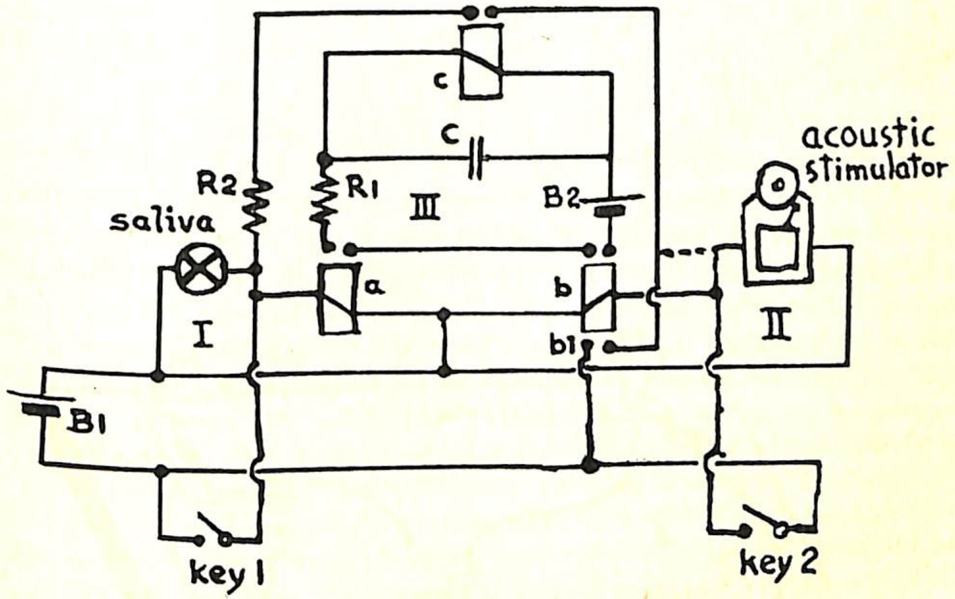

FIGURE 2
Pavlovian Model B

Values of circuit elements:
*B*1, 2, 4 Volts
Relays a, b, *especially* c, highly sensitive types with about 0.5 mA response current and 5-10 kOhms winding resistance
*R*1: 500-1000 Ohms, *R*2:5-10 Ohms (depending on the types used for lamp and relay a)
C 1000 mF

following abilities: (*a*) to gather experience; and (*b*) to switch over the responses in accordance with such experience. The gathering of experience is imitated by condensers, and switching is done by relays.

The idea for constructing the model is thus the following: Both systems I and II are to have one relay each. If, therefore, key 1 is pressed down, the relay a is closed; likewise, if key 2 is pressed down, relay b is closed. The switching contacts of the two relays a and b are connected in series and are joined to a circuit III (in this case the artificial brain). It follows therefore that the artificial brain is able to operate *only* if *both* keys 1 and 2 are pressed down simultaneously, for only then is circuit III closed. Thus, "learning" begins only after food (system I) *and* bell (system II) enter into action *simultaneously*.

This is the essence of the idea. Everything else is nothing but technical routine work. System III consists of a current source B2 (it would be possible to use B1 for this purpose), which charges a condenser C (the "memory") by way of a resistor R1. As soon as the condenser C has attained a certain voltage, which requires pressing down the two keys 1 and 2 simultaneously about 10 times (training period), relay c begins to operate and it establishes an electrical connection between the bell and the lamp, i.e., between the sound of the bell and the secretion of saliva. The artificial dog has thus "learned" to respond already to the bell alone by salivating. As, however, the condenser voltage is not conserved for an unlimited period, but decreases slowly (by way of the coil of the relay c, which is connected in parallel), also the artificial dog, just like the real one, "forgets" after some time what he has learned. It must from time to time be newly "conditioned" (see training period) in order that it may take the bell seriously.

Finally, there are still other elements in the circuit. They serve the purpose of preventing undesired side-effects. Relay b1 serves the purpose of preventing the artificial dog from salivating permanently as soon as relay c is closed. If, instead of relay b1, wire connection were established by way of the dotted line (in Figure 2), permanent salivation would be stopped, but, on the other hand, this would cause the much more peculiar phenomenon, which has in no way been empirically confirmed, that also the bell has learned to ring while the dog is being fed.

R2 has a similar reason. Without it the artificial dog would be reinforced in its conditioned response also every time the bell were to ring alone, which is also not in agreement with empirical facts. The relay a has to be avoided from operating (i.e., closing its contacts) at the moment the current for turning on the lamp is fed via "memory" and not by pressing the key 1.

The resistance R2 produces a small decrease in voltage which avoids the parallel connected relay a to operate.

For readers wishing to think further, it is just these latter circumstances which show that the artificial dog is much more stupid than the natural one. The model shown is, as may briefly be said, a "reproduced model." However, I should like to warn against applying this to all biological models. There are models that show not only that for which they have been constructed, but which, in addition, imitate new empirical data. Only such models are of immediate scientific value beyond the purpose of the demonstration, like hypotheses that need not be changed as soon as new empirical data become known (1, 3).

A particularly effective demonstration of the described model in connection with psychological instruction may be given if students first become acquainted with Pavlov's classical experiment. It is then shown by means of the eyelid reflex (2) that this applies also to humans. This demonstration is simple and works in most cases also without a complicated apparatus. What is required, is an empty spectacle frame with a rubber tube fastened to it (the opening of which is directed upon the eye), and, at the end of the tube, a rubber ball. The neutral stimulus is in our case a bell.

The experimenter at first states that ringing the bell exercises no influence upon the motions of the test subject's eyelid. Next, he compresses the rubber ball after having given a sign with the bell. Compressing the rubber ball causes a most disagreeable draught directed against the eye, and the lid closes by an involuntary movement (unconditioned response). After this procedure has been repeated several times, there follows the third act of the play (of course without revealing anything about it to the subject): The experimenter operates the bell alone, and: lo and behold, the subject blinks with his eyes (conditioned response).

Now the moment has come for demonstrating the electronic model, in order to show that actions of learning of this kind require neither mind nor soul, but that they are just as well "mechanically" to be imitated, provided that all the psychologist wishes to do is to reconstruct external behavior.

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The Journal of Genetic Psychology, 1962, **100**, 337-344.

REACTION OF HIGH SCHOOL STUDENTS TO TELEVISION TEACHERS*[1]

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A. INTRODUCTION AND PROBLEM

There is a substantial amount of evidence supporting the contention that students achieve as well when they are taught by television as when they are taught by conventional classroom procedures. Much less evidence is available, however, regarding the attitudes of students toward teaching by this medium.

The purpose of this study was to evaluate the differential reaction of high school students to teachers when classes were conducted by television-correspondence and by regular classroom procedures. No attempt was made to assess changes in subject matter knowledge in this study.

The present study was conducted within the framework of the Nebraska In-School Television-Correspondence Study Program. The purpose of the over-all program was that of determining how correspondence study and television can be combined most effectively and with greatest value to high schools. The correspondence feature makes this study different from most TV evaluation studies.

An experimental design involving the same teachers and the same students under the two instructional conditions was developed for this portion of the study. In general, two groups of high school students enrolled in plane geometry and two groups enrolled in senior English experienced one semester of television-correspondence instruction and one semester of conventional classroom instruction by the same teacher in counterbalanced order.

B. EVALUATIVE INSTRUMENTS

Evaluation of student reaction to teacher characteristics poses a particularly difficult problem because few standardized instruments are available for the measurement of such reactions. It was necessry to construct the majority of the instruments used in the present study.[2]

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* Received in the Editorial Office on June 6, 1960.

[1] This study was supported in part by a grant-in-aid from the Educational Television and Radio Center in Ann Arbor, Michigan. The authors wish to express their gratitude to several key persons who made this study possible. They include: Dr. Knute D. Broady, Director of the University of Nebraska Extension Division, for consenting to include this study as a part of a larger project under his direction; and school superintendents Sam Metcalf, Robert Schultze, and Richard Whitmore and their faculties for providing testing and interviewing facilities and scheduling arrangements necessary for the conduct of this study.

1. *Purdue Rating Scale for Instruction*

One standardized instrument, the Purdue Rating Scale for Instruction by Remmers and Elliott (2), was used. The PRSI was designed to provide a "sensitive evaluation of instructors by their pupils." For each of several traits the student is asked to indicate a point along a ten-point continuum that is most characteristic of the teacher being rated. Ratings were completed at the end of each semester. Responses to each trait are scored from one to ten and a composite can also be obtained. The traits measured with the portion of the PRSI used in this study are: interest in subject, sympathetic attitude toward students, fairness in grading, general attitude, presentation of subject matter, sense of proportion and humor, self-reliance and confidence, personal peculiarities, personal appearance, and stimulation of intellectual curiosity.

2. *Attitude Scales*

Three attitude scales for each course were constructed. The scales measured attitude toward the method of instruction, the subject, and the teacher. Each scale was individualized for each course and each teacher.

In constructing these scales positively and negatively phrased statements were prepared and subjected to pretest item analysis before being incorporated into the final forms of the scales. The final forms of the three scales were based upon the Likert technique of attitude scale construction and contained from 15 to 18 items.

Spearman-Brown estimates of reliability based upon the administration of the scales to the English students in this study at the end of the first semester were found to be .87 for method, .84 for subject, and .89 for teacher. Test retest reliability coefficients for the method and subject scales were found to be .91 and .89 for 22 high school geometry students based upon a ten-day interval.

Each student responded to the three attitude scales at the end of each semester.

3. *Semantic Differential Scale*

The "semantic differential" approach of Osgood, Suci, and Tannenbaum (1) to the measurement of perceptual differences was also used. The scale used in this study consisted of eighteen pairs of "opposite adjectives" and was administered at the end of each semester. Scoring was accomplished by assigning weights of 4, 3, 2, 1, 0 or 0, 1, 2, 3, 4 to scale spaces between the paired adjectives. A total score was obtained by summing the responses to those pairs containing the following adjectives: interesting, friendly, calm, polished, cheerful, adaptable, relaxed, sociable, organized, patient, and humorous. It should be emphasized that for several of the paired adjectives the direction of the weights was determined arbitrarily.

C. RESULTS

The data collected in this portion of the experiment included quantitative scores and responses obtained in private interviews. Only the quantitative results will be presented in this report.[2]

For the statistical analyses, results from the first and second semester for each type of instruction were pooled within each of the two courses taught. Pooling was accomplished, however, only after inspection revealed no interaction between order and type of instruction. The *t*-test for correlated samples was used to determine the significance of the difference between the mean scores for the two types of instruction. Separate analyses were made for the English students and for the geometry students. In each class the number of male students was nearly equal to the number of female students. The experimental design minimized this and other student variables.

1. *Purdue Rating Scale for Instruction*

When the scores for the ten individual teacher characteristics were combined to form a composite, it was found that the mean total score for the English teacher under the classroom condition was significantly higher ($t = 2.39$) than that under the television-correspondence condition. Only two of the ten differences between means for the two types of instruction were significant when considered individually, but the combined effect of the advantage of the classroom condition over the television-correspondence condition for six of the other characteristics was sufficient to result in a significant difference between the total score means.

The students felt that the English teacher showed a more liberal attitude and presented the subject matter more effectively in the classroom than during the televised instruction. The *t*-values of 2.03 and 2.18 respectively were significant at the .05 level.

The PRSI scores for the geometry teacher were analyzed in a similar fashion. A significant difference between means for the two types of instruction was not found.

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[2] A more complete report of the study, copies of each scale used, and responses to individual interviews with the students can be obtained from Professor Charles O. Neidt, University of Nebraska, Lincoln 8, Nebraska.

2. *Attitude Scales*

The results from the analyses of the three attitude scale total scores for the English and geometry students are shown in Table 1. Inspection of this table reveals that the English students reflected a significantly more favorable attitude toward methods, subject matter, and teacher when the course was taught in a face-to-face manner than when instruction utilized the television-correspondence procedures.

TABLE 1
ATTITUDE SCALE SCORES

Attitude test	Class mean	T-C mean	SE diff	t
English (N = 38)				
Method	42.89	32.53	1.13	9.17
Course	41.71	39.18	1.13	2.24
Teacher	55.45	50.50	1.33	3.72
Geometry (N = 39)				
Method	41.73	35.70	1.70	3.55
Course	37.95	37.68	1.27	.21
Teacher	56.41	55.43	.92	1.07

English—Required for Significance (37 d.f.) 1 per cent = 2.715, 5 per cent = 2.026
Geometry—Required for Significance (38 d.f.) 1 per cent = 2.711, 5 per cent = 2.025

From Table 1 it can be seen that the geometry students held a significantly more favorable attitude toward methods during the classroom instruction than during the television-correspondence instruction.

Whereas total score comparisons are meaningful in general, such scores are composites resulting from the summation of many individual item responses and do not permit isolation of specific differences. To identify specific items associated with differences between the two types of instruction, an item analysis of all three scales for both the English and the geometry students were made.

The individual items which discriminated between face-to-face and T-C conditions appear below. In responding to each item below the face-to-face condition evoked a more favorable rating by the students except when a * appears before the item.

ENGLISH AND GEOMETRY

I like the way English (geometry) was taught this semester.
I would have liked to ask more questions this semester.
I knew how I was doing in English (geometry) all semester.
Students really paid attention to the teacher in this class.
It took too long to get my test papers back in this class.

I had plenty of opportunities to work on my own this semester.
This English (geometry) class is the best class in high school in which creative (logical) thinking can be taught.
This class in English (geometry) has helped me to develop an appreciation of the writings of others (space relationships).
Miss Montgomery (Mr. Wells) is well liked by everyone.
Miss Montgomery (Mr. Wells) explains each lesson thoroughly.
I think that Miss Montgomery (Mr. Wells) is an excellent English (geometry) teacher.
Miss Montgomery (Mr. Wells) has many different ways of explaining a difficult point.
Miss Montgomery (Mr. Wells) used examples that were meaningful to me.

ENGLISH ONLY

We covered the subject too fast this semester.
I believe that too much written work was required.
There was too much emphasis on things that weren't important this semester.
It was too easy for slackers to get by this semester.
I received experiences in this English class that will be valuable all my life.
This English class is only for those who need a background for further writing and self-expression.
I would not recommend this course in English to anyone.
Students really respect Miss Montgomery.
Miss Montgomery was sometimes pretty vague in explaining things.

GEOMETRY ONLY

There was a lot of time wasted this semester.
This course in geometry should be required of all students for graduation from high school.
*Only the brighter students benefit from a course in geometry.
The subject matter of geometry is too mechanical and formalized.
Mr. Wells knows a lot about geometry.
Mr. Wells seldom got impatient this semester.

3. *Semantic Differential Responses*

The responses made to the semantic differential scale items by the English students are summarized in Table 2. Inspection of this table reveals that the English students perceived the experimental teacher differently under the two instructional conditions of five characteristics. In the classroom, the English students perceived their teacher as being more interesting, relaxed, organized and humorous than on television. The English students perceived their teacher as being more polished in the television situation, however. There was no significant difference between the two conditions with respect to the mean "total" score based upon responses to the eleven items previously mentioned.

The results of the analyses of the responses to the semantic differential scale for the geometry students were analyzed in a similar fashion. No significant differences between the two conditions were found for the "total" score or for the scores of the individual characteristics.

TABLE 2
SEMANTIC DIFFERENTIAL SCORES FOR THE ENGLISH TEACHER
(N = 38)

Characteristics				
Dull-interesting	3.66	2.95	.18	3.94
Polished-awkward	2.82	3.18	.14	2.57
Nervous-relaxed	3.29	3.05	.11	2.18
Disorganized-organized	3.55	3.03	.17	3.06
Humorous-dry	3.50	3.08	.18	2.33
Total	35.58	33.92	.85	1.95

Required for significance (37 d.f.) 1 per cent = 2.715; 5 per cent = 2.026.

D. DISCUSSION

The final answer to a question as broad as the one involved in this study cannot be obtained from a single research effort. Nevertheless, some degree of generalization is suggested by the results presented in the foregoing section. Before making conclusions from the data obtained in this investigation, however, there are several limitations of the study which should be recognized. (*a*) The data in this study were based entirely upon verbalizations of students rather than upon overt behavior. (*b*) The study involved only two teachers and two courses. (*c*) Some confusion may have existed in the minds of the students regarding the combination of television instruction and correspondence study involved in this experiment, and their reactions to the teacher may have been influenced by their correspondence experience.

Whereas interpretations of these results are subject to certain limitations, several features are worthy of note. The design of this study permitted the control of individual differences among teachers; a result of using the same teacher for both conditions. In many studies reactions of students to television teachers have been compared with student reactions to different teachers in the classroom. Likewise, control of individual differences among students has been difficult. In this study the same students experienced both instructional conditions. The inclusion of two courses in the present study represents a limited amount of replication—a feature which has sometimes been lacking in research in this area.

From both the quantitative data collected in this study and from the interview responses, three inferences can be formulated. The inferences involve previous television experience of the teacher and reaction to television as a medium of instruction.

The geometry teacher in this experiment had had one year of previous experience with television teaching. There was relatively little evidence to indicate a differential reaction to his characteristics under the two conditions. This finding supports the contention that the reaction to the characteristics of an experienced television teacher is the same under the two conditions. The English teacher had had no previous television experience. In her case, there was some evidence of a difference between the reaction to her characteristics under the two conditions, and these differential reactions pertained to relatively modifiable characteristics (more relaxed and humorous in the classroom, more polished on TV, more talkative, organized, interesting and thorough in the classroom).

There was substantial evidence that the students held a more favorable attitude toward the teacher and toward the subject matter of English in the classroom than in the television conditions. Similar evidence was not found with respect to geometry although in both classes the students felt that the teaching was more varied and thorough in the classroom condition.

Since the students held about the same attitudes toward the geometry course and teacher in both situations and since this teacher had previous experience with televised mathematics instruction, it would be well to determine the effect of television teaching experience on student acceptance.

It would also be desirable to look for changes in student attitude after their successful completion of televised coursework and to study the reactions of students to other specific courses.

E. CONCLUSIONS

Both quantitative and qualitative data were obtained indicating that the majority of students preferred the classroom condition to the television condition when the same teacher is available. Apparently, the most influential factor contributing to unfavorable attitudes toward television is the lack of intercommunication between teachers and students.

The conclusions of this study may be summarized as follows: although high school students prefer conventional classroom instruction to television-correspondence instruction, it is not because they perceive the characteristics of the teacher differently in the two situations, but because of factors inherent in the instructional television situation.

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The Journal of Genetic Psychology, 1962, **100**, 345-354.

EVALUATING THE ORGANIC CHILD: THE FUNCTIONAL ORGANIZATIONAL SCALE*

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The psychological evaluation of the child with brain-damage is a complex and time consuming task. The clinician confronted with a child who for one reason or another is not effectively interacting with his environment is first and foremost charged with the responsibility of assessing the child's present functioning and then interpretively integrating such findings in such a manner as to not only formulate an organized accounting for such function, but also to establish an organized formulation of therapeutic needs.

For the past eleven years, the staff of the Child Development Division of the Jewish Vocational Service in Milwaukee has been devoting its major energies to the development of a specialized program for the brain-damaged child and his parents. This development has been directed into three areas:

a. Evaluation: To devise techniques for the evaluation of the brain-damaged child which will lead to adequate diagnosis and effective therapeutic planning for his learning problems.

b. Training: To devise specialized educational techniques to aid in the perceptual and behavioral organization of the child.

c. Counseling: To devise a specialized technique of parent counseling aimed at altering the perception of the parents and teaching them a specific set of principles to guide them in the home management of the child.

During the course of these eleven years, we have had the opportunity to evaluate the development of over fifteen hundred children with, or suspected of having brain-damage, to intensively work with more than four hundred of these children in terms of educational relationships and to have counseled on a fairly intensive basis approximately nine hundred parents.

It is from this background that the concepts to be offered today have emerged.

Historically, the problems of brain-damage and the functional and psychological consequences have occupied the attention of two main types of investigators, the neurologists and physiologists in medical settings dealing with adult patients and the animal experimentalists dealing with various

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* Received in the Editorial Office on June 3, 1960.

sub-human subjects in university or hospital allied settings. Interest in, and the study of brain-damage in children, is of comparatively recent origin.

In his original summary of the literature on brain-injury, which covered the period from 1870-1945, Klebenoff (7) reported only two studies which investigated psychological problems associated with brain-damage in children. Nine years later, Klebenoff, Singer and Wilensky compiled another summary of research on the psychological consequences of brain lesions and ablations and this time devoted a separate section to the studies related to child problems. (8)

The growth of interest in child problems during that period stemmed from the Werner-Strauss (12) studies of brain-injured versus non-brain-injured, mentally retarded; from concepts and investigations of Doll (5); from the writings of Bender, and from the Cruickshank and Dolphin (3) studies on cerebral palsied children, and other authors who reported single studies.

The design and construction of well-validated psychological instruments has been minimal. Strauss described a series of tests, utilized in his studies which have not been generally adopted or accepted by clinicians. Cruickshank essentially employed the same series with similar results (3). Bender (2) has utilized her Gestalt test on child populations and Cruickshank and Bice (4) have conducted extensive evaluations of Gestalt Drawings. The same authors have studied figure background relationships in cerebral palsy (4). Bender and Silver studied human figure drawings and reported on their body-image concept. In 1953, Goldenberg (6) reviewed the use of psychological tests in the evaluation and differentiation of brain-injury in children covering intelligence tests, perceptual studies, critical flicker frequency investigations, visual retention tests, figure-ground tests, sorting, drawing and block design tests. He concluded that none of the tests were completely reliable, but that some showed promise. In his own study employing a test battery, Goldenberg reported that the Strauss-Werner Marble Board and the Ellis Visual Designs were the most adequate combination of tests for the purpose of diagnosing brain-injury in children.

In the main, we conclude that the specific development of psychological instruments for the diagnosis, differentiation and evaluation of brain-damage in children has shown some promise but has offered little direct help to the clinician in the day by day practice of evaluating child problems.

We continue to argue in the literature and in panel discussions the matter of terminology, whether or not such an entity actually exists, and the efficacies of such classifications for child problems. At the present time, a broad review of the field suggests that there is some agreement that the organic child must be reckoned with, but there is much disagreement as to how this shall be achieved test-wise and in clinical practice.

It seems to us that there are several avenues of recourse to the clinician as he attempts to understand more fully the complex problem of the organic child: (*a*) If he is an eager scientist, and the opportunity is present, he may conduct his own experimental investigations and contribute to general understanding in the field. (*b*) He may rely upon the meager studies which are available and await the results of current investigations. (*c*) He may avidly investigate adult literature with particular attention to the work of Penfield and Associates on the temporal lobe, and the work of Denny-Brown and Associates on the parietal lobe, and attempt to translate these findings into child counter-parts. While this suggestion has questionable validity at this point, the findings from the adult field are generally based upon precise localization and offer much in the way of understanding the child's problem. (*d*) He may, in similar manner, devote time to the reports of animal experimentation, such as those of Kluver & Bucy, Feldberg, Harlow and others, as a means of acquiring better understanding. (*e*) He may adopt a particular frame of reference or a set of theoretical assumptions to utilize as a guide while employing existing psychological devices to conduct his investigation of the individual child.

We believe that all five avenues are necessary at the present time for any clinician interested in understanding the impact of brain-damage upon a given child.

Our own analysis of both adult and child literature and animal studies has led us to conclude that two elements may be isolated as crucial indicators—organization and integration.

A set of basic postulates have been formulated as a guide to our work with these children.

1. The fundamental law of development is increasing differentiated hierarchic integration.
2. The human organism is inherently an organized being following organized patterns of development.
3. The primary impact of brain damage, structural deformity or metabolic disturbance in the child is one of interference with orderly, sequential processing of development.
4. Normal processing proceeds sequentially from sensation to perception to symbolization to conceptualization to abstraction.

5. Any individual may encounter such processing at any moment in development according to familiarity with a particular stimulus.
6. The primary drive of the human organism is directed toward an organized adaptive response to his environment.
7. Organic damage interferes with the development of effective, organized, adaptive responses. What organization has been achieved may be tenuous, poorly organized, and environmentally vulnerable.
8. Organized adaptive response is related to cultural and environmental demand.
9. Since the child with brain-damage has difficulty organizing response patterns, he is persistently at the mercy of stress producing situations in his environment. He is environmentally vulnerable from all corners, or perhaps only from one corner, depending upon the extensiveness of organized response patterns.
10. Since he is so readily threatened, he must defend himself against complete chaos. His defense patterns are many and may be expressed for short duration or for lengthy periods. Along with all of the customary defense mechanisms employed by human organisms, the following may also be regarded as defense mechanisms or protective symptoms: distractibility, hyperactivity, perseveration, sporadic loss of control, destructive or aggressive episodes.
11. The vulnerability to stress then becomes a crucial factor which is related to the complexity of the organizational level of the child. The better organized, the more highly differentiated and the more effectively integrated the child is, the less will he require bizarre and unusual reactions to stress. The human individual *learns* organized response patterns.

On the basis of these postulates, it seems to us that the process of evaluating these children must, therefore, be directed toward two ends, one, the establishment of an Organization Index, and, second, the establishment of a Learning Index. In other words, we must evaluate functional organization as an indicator of the state of organism and the tools he has developed for meeting the demands of his world, and also determine his ability to learn a set of more effective responses.

Although we believe that the eventual goal is the establishment of an Organization Index and a Learning Index, we have not yet reached a point either in our thinking or our data which would enable us to clearly specify a design for such indices.

We have, however, developed a *Functional Organizational Scale,* which has proven extremely useful in daily clinical practice and, hopefully, will eventually permit a more formalized attack on the development of an Organization Index.

TABLE 1
FUNCTIONAL ORGANIZATIONAL SCALE

Function	Organized	Immature	Disorganized
Normative:			
1. Visual discrimination			
2. Visual memory			
3. Auditory discrimination			
4. Auditory memory			
5. Form drawing			
6. Figure drawing			
7. Quantitative concepts			
8. Picture interpretation			
9. Conceptualization			
10. Expressive language			
11. Receptive language			
12. Motor development			
13. Social maturity			
Observative:			
14. Color knowledge			
15. Spatial relationship			
16. Sequentialness			
17. Organizational approach			
18. Oral formulation			
19. Inner language			
20. Body image			
21. Tactile perception			
22. Figure-ground			
23. Attention			
24. Persistence			
Deductive:			
25. Stress tolerance			
26. New situations			
27. Peer relationships			
28. Parent relationships			
29. Hygienic patterns			
30. Reward response			

The Functional Organizational Scale is presently composed of thirty items. It has been utilized in the evaluation of children from one year to sixteen years. These thirty items are currently employed, but we feel that the list may increase or diminish with experience. The scale is divided into three parts: the first thirteen items permit the utilization of established norms for various tests and are classified as *Normative.* Items 14-24 are dependent upon observable responses in a clinical testing situation and are classified as *Observative.* The remaining items are classified as *Deductive* and rely upon deductions from parental reporting and continued observation in a variety of settings.

It has not been the practice of the agency to evaluate all the children with a routine battery of psychological tests. The evaluation instruments used vary according to the age of the child, his manifest behavior, the particular type of information sought, and the specific problem which caused his referral to the agency. Some form of test procedure and instrumentation, where feasible, is used for every child to secure a level on each of the functional areas.

Three terms are employed to differentiate functioning levels: *Organized, Immature,* and *Disorganized.* The term *Organized* indicates that the function is adequately established and effective. *Immature* is assigned to functional activity which represents an organized response characteristic of an earlier level of development and indicates a retardation. *Disorganized* is assigned to those functional areas in which performance is inconsistent, erratic, bizarre, or confused. In all instances, care is taken to avoid the possibility that a given area is defective as a result of physical factors, such as, severe visual or auditory problems. In all cases of vision or hearing disorders which might account for the rating of *Immature* or *Disorganized,* the child is referred to ophthalmologists or otologists for clarification.

The criteria for rating performance into one of the three classifications is as follows:

Organized (O): The functional area is rated as "O" if the child's performance is commensurate with the expected level of achievement for his chronological age according to the norms on various tests. A scaled score of 8 or more on a test, or an age score equal to the child's chronological age, or less than one year below his age, is classified as "O". He is also rated as "O" if his ability to function effectively on reading-readiness tasks occurred at the same age level expected in the regular public school process.

Immature (I): The child is rated "I" in a functional area where his performance is organized and meaningful, but was not quantitatively up to his chronological age level. If performance of a six-year-old child reveals the organized ability to function at a four-year level on a visual memory task, his performance is rated as "I". If his drawings are organized, but qualitatively or quantitatively regarded as characteristic of an earlier level of development, this is rated as "I". An age score 1-3 years below the chronological age is rated as "I".

Disorganized (D): The functional area is rated as "D" if the child is unable to respond, if his response is irrelevant and inappropriate, or if his response reveals a serious distortion.

Entries of O-I-D are made in the respective columns by the clinician as various tests, performances and reports are analyzed. Wherever it is possible to indicate a specific age level, from test norms, or from developmental scales, the age number accompanies the O-I-D letter in the respective columnar box. For example, a five-year-old child who manages to copy a circle, but is confused by the drawing of a square, would be rated as I-3 in the area of form drawing. This would indicate to the clinician that the ability to graphically copy geometric forms is at the immature level of a three year old, according to existing understandings of the progressive development in form drawing.

It must be understood that, wherever possible, existing norms from psychological and educational tests are employed. In the *Observative* and *Deductive* items, the rating is clinically subjective and is related, wherever possible, to existing descriptive norms for child development. The *Observative* and *Deductive* items rely upon interview data, observation of and report of child-parent dynamics, reports from teachers and therapists, and from protracted observation by the clinician.

The scale, at the present time, must be primarily regarded as a clinical tool useful for the organization of data on a developmental basis for individual children. It offers the clinician the opportunity to composite test results, observations and interview data in such a manner as to reflect strengths and weaknesses in the child, and enables the clinician to formulate a therapeutic learning program.

Utilizing this scale, we find it possible to classify the child with brain-damage into one of four learning classifications indicative of primary learning problems.

The four classifications are *Behavior, Symbolic, Immature* and *Sensori-Motor.* Children classified in the *Behavior* group are rated as Organized in at least ten of the thirteen *Normative* functions on the scale, but may be rated as Immature on Disorganized on all other items. These are the children who can usually manifest average or higher intelligence on standard measurements, but who have great difficulty adjusting interpersonally at home, play and school. They are frequently hyper-talkative, distractible, and confabulatory in their thought processes and non-conforming. They are usually described by their teachers as difficult to manage. They also have a major problem in tasks requiring organization, such as book reports, outlines, projects, etc.

The *Symbolic* group is composed of children whose major problem is either an Expressive or Receptive language disorder. In formal testing, non-verbal tasks are managed with skills equivalent to their chronological age. On all items on the scale, it is possible to differentiate effective function versus ineffective on a verbal versus non-verbal level. The problem here is one of acquisition of symbols, not articulation of speech.

The *Immature* group has a preponderance of Immature ratings on all three levels of the scale. Functions may be established in an organized manner, but quantitatively are measured or rated as being two or more years below their chronologic age level. This is the group we think of as the educable mentally handicapped. Organized function is achieved at the simplicity level and breaks down at the complexity level.

The *Sensori-Motor* groups are characterized as having random, purposeless and meaningless responses to their environment. They respond to sensation and respond motorically, but these responses are not integrated into meaningful behavior patterns. They usually impress the clinician as being "non-learning" organisms. These children are untestable with existing instruments.

These classifications suggest the level of learning therapy to be used in helping the child to achieve a higher level of organization and a more effective integration, and have proven helpful in clinical practice.

Finally, there are a number of considerations which we would like to express which may further clarify the dilemma of the psychologist:

1. During the past eleven years, we have been asked to evaluate severely motor involved children with cerebral palsy, a number of phenylketonurics, post-surgical cases, post-accident cases, post-encephalitics and post-meningitics, children with structural brain defects, birth trauma cases, all forms of epileptics, and a large number of children simply classified as "organic." Throughout this experience, we have continually been disappointed with available psychologic instruments. Tests seldom tell us what we want to know. Clinical insight and careful analytic observations are far more helpful.
2. Virtually no work has been done on relating function to localization in children and present day findings in adult work suggest that concepts of brain function remain controversial. We do not feel that psychology is presently in any position to contribute meaningfully to localization in children. Some research work at Northwestern University may soon help in this regard.
3. The controversy between emotional disturbance and organic damage as a diagnostic classification continues. In this respect, we would like to indicate that a almost every organic child whom we have evaluated has had an emotional disturbance.

4. Taking all matters into consideration, the number of tests available to the clinician, the reliability of such tests, the variability of individual children, the uniqueness of familial and cultural background, and other factors, we believe that existing individual tests of intelligence, principally the Binet, WISC and LEITER, represent the most effective composite for evaluation.

   Despite the many criticisms which may be levelled against any of these instruments in terms of validity, reliability, etc., they do represent a group of structured tasks more or less designed on an increasing complexity basis which permits the clinician to observe many aspects of response, integration and organization.

   All of the intelligence tests provide a tapping of functional ability in various areas and qualitative analysis of the functional efficiency which contributes to or detracts from the resultant IQ provides a good deal of understanding of therapeutic assets and liabilities.
5. In final analysis, we are primarily concerned with the manner in which the organic problem interferes with learning. In some cases, with clear cut neurological findings, no problem in learning could be ascertained. This is the upper end of a continuum. At the lower end are those children whose behavior is so disorganized and confused that they may be regarded as "non-learning" organisms. It seems to us that, unless the psychological evaluation is oriented to the evaluation of learning impairment and learning potential, it serves no useful purpose to the child. Psychological evaluation related to localization, extent, patterns, etc., may eventually prove useful to the general field, but the clinician must primarily orient to the child's "learnability."
6. We also believe that the evaluation of perception is an important element in the field of brain damage. Unfortunately, the study of perception in this field has been limited to Gestalt-oriented type of investigation. Our concept of perception embodies the thinking of a wide variety of theorists as discussed by Allport (1).
7. Finally, we feel that the eventual understanding of organic damage in children will be formulated along the lines of various continua. There will be continua related to sensitivity to stress, learnability, persistence, organization, levels of integration, and others, Future testing will be life-situational and will evaluate learnability "on the spot."

The child with brain-damage is a far more complex entity than the early writings of Strauss indicated. We have only scratched the surface in our understanding of this complexity. We believe that the psychology of brain-damage in children will eventually be written in terms of organization, integration and learnability. We also believe that the psychologists are uniquely fitted to provide major contributions in this area.

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The Journal of Genetic Psychology, 1962, **100**, 355-360.

EFFECTS OF EARLY AND LATE SOCIAL ISOLATION ON AGGREGATIVE BEHAVIOR IN THE DOMESTIC CHICKEN*[1]

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A. Introduction

While studies have shown the significant influences of early experiences on later behavior (3), the hypothesis that there are "critical periods" for learning early in life (5, 7) requires additional experimental confirmation. The most extreme interpretation of this hypothesis implies that certain kinds of learning can take place only during these early critical periods and that once having occurred, such learning is irreversible. Perhaps a less controversial and more generally acceptable interpretation of the critical period hypothesis is that early learning characteristically is more effective and more persistent than learning taking place at later stages of development.

A recent investigaton by Baron and Kish (1) of aggregative behavior in the domestic chicken, although demonstrating the importance of early learning, yielded results contrary to the critical period hypothesis. In this study domestic chickens, socially isolated for the first 4-5 weeks of life, showed markedly reduced tendencies to aggregate with a stimulus animal when compared to control subjects, socially reared in pairs or in a flock. But when these initially isolated subjects were permitted extensive social experience between the fifth and tenth weeks of life they then evidenced what appeared to be normal social reactivity. These findings were interpreted as suggesting that while social learning may naturalistically occur early in the life of the chicken, such learning may be possible at later stages of development.

The present report describes a further investigation of the resistance of early social learning to the influences of later social experiences. The extreme version of the critical period hypothesis implies that animals reared in social isolation during a critical period early in life will continue to show the behavioral effects of such isolation despite an intervening period of social contact. Similarly, it is implied that animals exposed to social contact during

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* Received in the Editorial Office on June 30, 1960.

[1] This research was supported by a grant from the Wilson Coe Research Fund. Lynn A. Brewster served as research assistant. The technical assistance of Professor J. R. Smyth of the College of Agriculture, University of Maine, is also acknowledged.

a critical period early in life will evidence normal social behavior later in life even after an intervening period of social isolation. The experiment reported here was designed to test these predictions.

B. Subjects and Rearing Conditions

The subjects were 24 White Rock chickens of a strain bred by the College of Agriculture of the University of Maine. Eggs were incubated and hatched in the laboratory.

The rearing conditions were the same as those previously reported by Baron and Kish (1). Under the social-rearing condition (*S*), subjects were housed in communal cages of wire mesh construction. Under the isolation-rearing condition (*I*), subjects were isolated from direct contact with other chickens and the experimenter in 12 inch × 12 inch × 12 inch opaque wooden cubicles with wire mesh floors. Food and water were provided in the isolation cubicles on a tray inserted through a slot in the wall.

Immediately after hatching, eight chickens were assigned to each of three groups. The *S Group* was reared under the social condition for the first ten weeks of life. The *S-I Group* was reared under the social condition for the first week of life and under the isolation condition for the next nine weeks. The *I-S Group* was reared under the isolation condition for the first week after hatching and under the social condition for the next nine weeks.

C. Apparatus

The test apparatus has already been described (1, 2). Essentially it consisted of a rectangular subject compartment (13 inches × 40 inches × 10 inches) at each end of which was located a display compartment separated by wire mesh screening. The mesh floor of the subject compartment was divided into three equivalent sections. The two sections nearest the display compartments were pivoted platforms so that depression by the subject's weight operated leaf actuator micro-switches. Two identical test apparatuses were located in the experimental room. In an adjoining room a kymograph recorded the amount of time the platform nearest the compartment containing the stimulus animal remained depressed and the number of times this platform was depressed and released.

D. Procedure

All subjects were observed in the test apparatus when they were five weeks old and again when they were ten weeks old. During each test session the subject was permitted unrestricted activity in the subject compartment of the apparatus for a two-hour period while a stimulus animal of the same age was in one of the display compartments and the other display compartment was empty. The display compartment occupied by the stimulus animal was alternated from subject to subject, and subjects were tested in systematic rotation among the three experimental groups. Following the five-week test subjects were banded for identification and returned to their respective rearing conditions.

E. Results

For each subject the per cent of time spent on the platform nearest the stimulus animal was determined. Each depression and subsequent release of the platform defined one unit of activity. Presented in Table 1 are the means and standard deviations of these time and activity scores for the five-week test and for the ten-week test. It may be seen that at five weeks, time and activity scores for the *S Group* and the *I-S Group* were approximately the same, and both groups showed more time and less activity than the *S-I Group*. But at ten weeks, while the *S Group* continued to evidence the greatest per cent of time and the least activity, the *I-S Group* now manifested the low time scores and high activity characteristic of the *S-I Group*.

TABLE 1
PER CENT TIME ON STIMULUS PLATFORM AND NUMBER OF ACTIVITY UNITS FOR THE THREE GROUPS OF SUBJECTS AT THE FIVE- AND TEN-WEEK TESTS

Group		Five-week test		Ten-week test	
		Per cent time	Activity units	Per cent time	Activity units
S	Mean	72.2	4.3	64.5	2.1
	SD	44.8	6.0	42.5	3.4
I-S	Mean	70.6	3.1	45.0	17.4
	SD	39.6	3.0	40.1	22.1
S-I	Mean	57.6	47.3	47.8	21.3
	SD	27.0	32.9	31.4	20.1

Because the assumptions necessary for conventional analysis of variance could not be met for these data, even through transformation of the scores, group differences were evaluated through less sensitive non-parametric tests. Despite the trends suggested by the mean time scores over-all time differences were not significant at either five weeks ($X^2 = 2.89$, *df* 2, $P = .20\text{-}.30$) or ten weeks ($X^2 = 2.48$, *df* 2, $P = .20\text{-}.30$). Intrasession group differences were most marked during the latter part of the five-week test and closely approached an acceptable level of significance during the sixth 15-minute period ($X^2 = 5.00$, *df* 2, $P = .085$) and the last 15-minute period ($X^2 = 5.23$, *df* 2, $P = .077$). Activity differences among the three groups were significant at both five weeks ($X^2 = 14.46$, *df* 2, $P = .01$) and ten weeks ($X^2 = 9.66$, *df* 2, $P = .01$). Both the *S Group* and the *I-S Group* were significantly less active than the *S-I Group* at five weeks ($P = .01$) but at ten weeks, the *S Group* was significantly less active than either the *I-S Group* ($P = .01$) or the *S-I Group* ($P = .01$).

F. Discussion

Ramsay and Hess (6) and Jaynes (4) have reported that imprinting, i.e., the rapid learning of following responses, takes place during the first few days of life for the domestic chicken. If only this period is appropriate for the learning of aggregate behavior, and if such learning is highly persistent, than either social contact or social isolation at this time should have significant effects on later social reactivity despite the nature or extent of intervening social experiences. The procedures of the present study permitted a test of this interpretation of the critical period hypothesis by comparing the control group (*S Group*), socially reared throughout, to subjects isolated for the first week and then reared socially (*I-S Group*) and to subjects given social contact for the first week of life and then isolated (*S-I Group*). It is to be noted that at both five and ten weeks the socially-reared control subjects confirmed previous observations of what appears to be the normal pattern of aggregative behavior by socially reared chickens (1). These subjects showed strong tendencies to aggregate with the stimulus animal and, in addition, low activity, which in view of the experimenters' observations of emotional behavior in chickens suggested a low level of emotionality as well.

It is apparent that the results do not confirm the expectation from the critical period hypothesis that social experiences during an early critical period are always more important determiners of aggregative behavior than later social experiences. At both five and ten weeks subjects reared socially for the first week of life and then isolated differed from socially reared control subjects by showing weaker aggregative tendencies and greater emotionality within the test environment. This finding, then, rather than demonstrating the exclusive influences of experiences during an early critical period, implies that the effects of early social contact may be reduced by later experiences of social isolation.

The performance of the subjects who were isolated for the first week of life and then reared socially presents a more complicated picture. At five weeks of age, contrary to the critical period hypothesis, there was no basis for concluding that these subjects, deprived of normal social experience during the early critical period, differed in any important way from the control subjects. This result confirms a previous study by Baron and Kish (1) in which five weeks of social experience subsequent to a period of early social isolation were found to produce normal social behavior. But from the five-week test to the ten-week test the early isolates of the present study evidenced a reduction in aggregative behavior and an increase in emotionality so that after nine weeks of social contact they differed from the control subjects. Changes in behavior as the period of social contact was extended suggest that early social isolation may have latent effects which require lengthy periods of social contact for their appearance. While further research is required to substantiate this conclusion, support is provided by Fisher (cited in 5) who found that socially isolated dogs were at first highly responsive to group raised littermates, but later tended to withdraw from social contact following several months of social experience.

The results of this experiment, then, do not confirm the predictions of the critical period hypothesis when this hypothesis is stated in its most extreme form. The results suggest that social behavior at a late stage of development is not always a simple function of learning at an earlier critical period of life but rather that the influences of early experiences may be modified by later learning. It would appear that only by taking into consideration the nature of experiences intervening between the early experience and the particular moment of observation can the behavior displayed at the moment of observation be completely understood.

G. Summary

An experiment was conducted to test the hypothesis that aggregative behavior in domestic chickens is acquired during a critical period early in life and that such learning is not subject to the influences of subsequent social experiences. Groups of animals were reared for the first ten weeks of life under three conditions: (*a*) in social contact with other chickens throughout; (*b*) in social contact with other chickens for the first week and in social isolation for the next nine weeks; and (*c*) in social isolation for the first week and in social contact for the next nine weeks. Observations of the social reactivity of each subject to a stimulus animal of the same age were conducted at five and ten weeks of age.

The results could not be interpreted as supporting the critical period hy-

pothesis. At both five and ten weeks subjects given social experience for the first week of life and then isolated showed lesser degrees of aggregative behavior and higher actvity (emotionality) than did control subjects, socially reared throughout. The group isolated for the first week of life and then reared socially was quite similar to the control group at the five week test but at ten weeks evidenced higher activity and a lower level of aggregative behavior.

It was concluded that the effects of early isolation or social contact may be modified by later social experiences. Social isolation following an early period of social contact reduces the effects of early social contact. Social contact following an early period of social isolation reduces the effects of early social isolation after short periods of social contact but may magnify these effects after longer periods of social contact.

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The Journal of Genetic Psychology, 1962, **100**, 361-375.

A STUDY OF MOTIVATIONAL DEVELOPMENT*[1, 2]

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A. INTRODUCTION AND PROBLEM

In a previous investigation of the relationship between motivation and social adequacy among normal adults (6), support was found for the notion that the more socially adequate adult is characterized by a greater preference for symbolic, internalized kinds of gratification such as self-approval and self-actualization. The argument was advanced that his more effective social functioning is due to a lesser dependence upon concrete support from the environment, made possible by his development of an internal source of support. This idea is consistent with Maslow's theory of a motivational hierarchy (8) in which it is proposed that self-actualization and esteem needs appear later in an individual's development than do physiological and love needs, and that mature psychological health is dependent upon the development and active fulfillment of these "higher" needs. In the investigation of adults, however, it was only possible to test hypotheses relevant to the upper level of motivational development because almost all of these subjects gave evidence of some familiarity with "higher" needs, and thus could not be differentiated in terms of different levels of development. For a test of the hierarchical notion as it applies to the course of development from one level of motivation to another, the addition of younger subjects seemed necessary. Accordingly, for the present study a group of 68 children ranging in age from six to 13 years was added to the sample of adults already studied, and the developmental implications of the hierarchy were tested on this combined sample.

The motivational hierarchy formulated for the study of adults was retained in the present investigation. This hierarchy preserves the essential

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* Received in the Editorial Office on July 1, 1960.

[1] This investigation was supported by the Dementia Praecox Research Project, Worcester State Hospital, and a research grant (M-896) from the National Institute of Mental Health, Public Health Service.

[2] The investigators are indebted to a number of persons for their contributions. Dr. D. Broverman read the present paper and made many helpful suggestions. The administration of the tests was carried out by Dr. Sybil Speier, and Mr. B. D'Agostino. Subjects were obtained through the help of the Worcester Boys Club and Mr. H. Blaukopf at the Jewish Community Center.

order of development proposed by Maslow, but also includes areas of gratification—pleasure in objects, play, and self-expression—which Maslow assigns to a category of "unmotivated" behavior because such behaviors generally involve no "striving." The conceptual difficulty is avoided if motivation is conceived in terms of the reinforcement value of certain events, as Rotter (11) has done, without reference to the internal drive state of the organism. Bindra (1) offers a similar interpretaton of motivation in terms of reinforcement categories. These theorists define reinforcement in empirical terms as a stimulus which increases (decreases, or maintains at a given level) the probability of a class of responses, further classifying such stimuli in terms of content categories. These approaches, then, emphasize what is generally regarded as the goal or goal-object of motivation, rather than its energizing aspects. Such a formulation permits the classification of play and other pleasurable and expressive activities as reinforcing events, and hence as goals or objects of motivation. The motivational hierarchy used here was, therefore, formulated in terms of different content categories of reinforcement, representing the different levels of development hypothesized. The levels are distinguished as follows: 1. Concrete, internal reinforcement (*e.g.,* physiological satisfactions, physical comfort and safety, freedom from fear and anxiety *per se*). 2. Concrete, external reinforcement (*e.g.,* money, material goods, affection, belongingness, concrete praise and reward). 3. Abstract, external reinforcement (*e.g.,* social approval and esteem, popularity, prestige, fame). 4. Abstract, internal reinforcement (*e.g.,* self-respect and self-approval, self-actualization). In this context, the dimension "concrete-abstract" refers to the type of reinforcer, *i.e.,* tangible events such as eating or being praised (concrete), or intangible events such as approval or esteem (abstract). The dimension "internal-external" refers to the locus of the reinforcer—whether it is essentially internal as in physical comfort and self-respect, or essentially external as in possessions and social esteem.

The hierarchy, from 1 to 4 as shown, is intended to reflect the hypothetical progress of an individual from concrete, primary reinforcement to the acquisition of abstract, secondary reinforcers. Quantitative and qualitative aspects of the development are conceived as follows: Quantitatively, it is presumed that with expanding social experience secondary reinforcers of all kinds will be acquired, yielding a general increase in the number of effective reinforcers with age. Qualitatively, the individual attains a new level of development when he acquires secondary reinforcers belonging to that level. Reinforcers at a new level rest, of course, upon the previously established reinforcement of earlier levels. Maslow's theory of "prepotency" also carries this implication in its contention that higher level motivation rests upon the gratification of lower level needs. Development is thus viewed as a cumulative process, including both a horizontal expansion in the number of reinforcers, and vertical growth represented by the addition of new sources of reinforcement at progressively higher levels of the hierarchy. The individual thus acquires with motivational development multiple supports for his behavior in the form of additional reinforcers at attained levels, as well as acquiring new reinforcers at more "abstract" levels which render his behavior less dependent upon the immediate circumstances in his environment. Such development would seem to lead to the increased stability and independence which characterize mature as opposed to immature behavior.

The theory predicts, then, a general increase in the number of effective reinforcers with age, coupled with the appearance of reinforcers belonging to progressively higher levels of the proposed hierarchy. That is, older age groups are expected to show a greater number of reinforcers than younger age groups, and older age groups are expected to differ increasingly from younger groups at successive levels of the motivational hierarchy.

B. METHOD

The subjects were 68 boys ranging in age from six to 13 years and 36 male adults with a mean age of 36.0 years. Table 1 shows the number of subjects at different age levels, and the mean and standard deviation of vocabulary standard scores at each level, as measured by the WISC Vocabulary test among the children and by the WAIS Vocabulary test among the adults. The boys were obtained from two community centers. The adults were members of two Protestant churches and had volunteered their services in order to earn money for their respective churches. Both samples of subjects are characterized by a middle class socio-economic background.

TABLE 1

NUMBER OF SUBJECTS AND MEAN VOCABULARY SCORE AT EACH AGE LEVEL

Age group	N	Mean vocabulary score[a]	Vocabulary SD
6-7 yrs	16	12.1	2.46
8-9 yrs	20	11.5	3.14
10-11 yrs	20	11.4	1.96
12-13 yrs[b]	12	9.8	4.00
Adults Mean age = 36.0 yrs	36	13.2	2.49

[a] Vocabulary scores are scaled scores achieved on the WAIS Vocabulary by the adults and on the WISC Vocabulary by the children. WISC means are based on a total of 62 children: one subject in the 10-11 year group, four in the 8-9 year group, and one in the 6-7 year group were not given the WISC Vocabulary.

[b] One 14-year-old child is included in this group.

The necessary measures of motivation were obtained from fantasy material produced by the subjects on the Role-Taking Task (RTT), which has been described in detail elsewhere (4). In this test, adapted from Schneidman's Make a Picture Story (MAPS) test, the subject is asked to place at least three figures in a scene and tell a story about them as in the standard MAPS administration. After the stories are completed, each scene is again set up and the subject is asked to take, successively, the roles of each of the different actors in his stories, retelling the story from each actor's point of view. Two stories with their accompanying roles were used in the present study. All subjects were given the living-room scene as a background for their first story and used a scene of their choice for the second story. Adults told an additional story using a work-shop scene which was omitted from the comparisons of the present study. Testing sessions were recorded and a verbatim transcript was made of each subject's performance.

The method of scoring RTT protocols for motivation and the reliability of the procedure have been given in detail in the previous study of adults (6). Split-half reliability, computed on the basis of odd and even roles and corrected by Spearman-Brown formula, ranged from .72 to .93 for the four different levels of motivation. Scoring reliability, based on the scores assigned to each level by two independent scorers, ranged from .71 to .96 for the four levels. Briefly, the scoring method consists of assigning to the appropriate level of the hierarchy—1, 2, 3, or 4—each reinforcement clearly discernible in the behavior sequences and character descriptions given by the subject in the course of telling his stories and taking the roles of his various actors. Descriptive statements and accounts without readily interpretable motivational implications are not scored. Sample statements assigned to each of the levels are shown below. The samples have been chosen to illustrate the diversity of content included at any given level, and the range of sophistication of expression. Only the type and locus of the reinforcement implied by the subject's statement are considered in assigning the statement to a given level.

1. *Concrete, Internal Reinforcement*

Statements assigned to this level reflect a concern with physiological satisfactions, safety, or the release of tension for its own sake. For example:

> What he wants is some ice cream . . . . It's so hot he takes off his shirt to cool off . . . . He hides from the man with the gun because he doesn't want to get shot . . . . She puts on a temper tantrum to wear off some of the frustration she feels.

2. *Concrete, External Reinforcement*

This level reflects a concern with pleasurable objects and material goods, concrete reward, or affection and belongingness. For example:

> He wants Santa to bring him a new bicycle . . . . After supper he likes to watch TV . . . . He hopes his team will win the prize . . . . They want a summer cottage for weekends . . . . He only gets into fights because he craves attention and affection.

3. *Abstract, External Reinforcement*

This category is concerned with generalized esteem and popularity. For example:

> He doesn't want the other boys to think he's a sissy . . . . He wants everybody to think he's a good citizen of the U.S. . . . . He wishes he had an education so he could make a name for himself . . . . Keeping up with the Joneses is primary in their thinking.

4. *Abstract, Internal Reinforcement*

This category reflects an active concern with self-actualization and the intrinsic satisfactions of achievement. Also included in this category are statements concerned with self-respect, integrity and moral rightness. For example:

> He's practicing with his bat and ball because he wants to become a baseball player when he grows up . . . . He likes his work, it's a real challenge to him . . . . Even though he's a cripple he wants to make something of himself, become a real person. . . . She thinks you ought to be a good mother and teach your son the right things . . . . He doesn't believe he should soft-soap or walk around any issue in the department just to please his boss.

The classification of statements as shown above yields four raw scores for each subject, representing the number of his responses assigned to each of the four levels. A fifth raw score, Motivation R, represents the sum of the four categories or the total number of scorable motivation responses. The RTT protocols were scored in this fashion and sets of raw scores were obtained for each of the subjects without any knowledge of other variables of the study. Mean raw scores for the different age groups are shown in Table 2.

Since the RTT is a verbal task, a check was made on the relationship of the motivation scores to verbal intelligence. In the previous investigation of adults, it was found that RTT motivation scores were not significantly

TABLE 2
RAW RTT MOTIVATION SCORES OF AGE GROUPS

RTT variable	Means			Standard deviations		
	Adults (N = 36)	10-14 yrs (N = 32)	6-9 yrs (N = 36)	Adults (N = 36)	10-14 yrs (N = 32)	6-9 yrs (N = 36)
RTT Verbal Production, number of words	1,677	1,195	897	980	826	695
Motivation R	18.25	10.25	5.97	12.24	4.61	3.62
Level 1	4.89	3.47	2.67	2.96	3.06	2.48
Level 2	10.53	6.19	3.06	8.54	3.45	2.32
Level 3	.83	.13	.03	1.07	.42	.16
Level 4	2.00	.50	.22	1.83	.98	.58

related to verbal intelligence as measured by the WAIS Vocabulary test. Correlations ranged from .05 to .19. A check on the children's group of the present study revealed correlations between WISC Vocabulary raw scores and raw motivation scores of the order of .43 and .38, for Levels 1 and 2 respectively. When sheer verbal productivity on the RTT is held constant by partial correlation, these relationships are reduced to .38 between WISC and Level 1 motivation and .36 between WISC and Level 2 scores. Therefore, although among the children the RTT motivation scores appear to have some relationship to verbal intelligence, there is no differential relationship with higher level and lower level motivation scores. That is, differential scoring at the higher motivational level cannot be attributed to the selective influence of verbal ability. Too few children received scores at the Abstract Levels 3 and 4 to warrant the above procedures. However, a *t*-test comparison revealed that the mean WISC score of the children who gave some Abstract level motivation (37.6) is not significantly higher than the mean WISC score of the children who gave no such motivation (32.8). Among both children and adults, then, it seems clear that developmentally high motivation scores on the RTT cannot be attributed to the selective influence of verbal intelligence, at least as this is measured by standard vocabulary tests.

In the previous investigation of adults, all the various RTT motivation scores were found to be highly related to the subjects' verbal productivity (number of words) in the Role-Taking situation. Although the children's motivation scores showed a much lower order of relationship to their verbal productivity, some of these relationships also reached significance. In addition, as Table 2 reveals, the adults were considerably more productive than the children. It seemed necessary, therefore, to control the motivational scores for RTT verbal productivity. Since discrete age groups were to be compared, the usual partial correlation procedure was not feasible. A method suggested by Cronbach (2) was used which may be called the "roving median" technique. The pooled sample of children and adults were divided into eight groups representing different degrees of RTT verbal productivity, subjects within each group manifesting roughly equal verbal productivity. For each such group, the median score on each of the motivation variables was obtained. The median score for a given variable was then subtracted from each member's raw score for that variable, yielding a set of deviation scores for each subject which represented the discrepancy, plus or minus, between his raw scores and the median raw scores of his productivity group. For convenience, a constant was added to the deviation scores to eliminate minus signs. All comparisons between children and adults were made in terms of these scores.

For the comparisons between older and younger children, similar scores were obtained by dividing the pooled sample of younger and older children into productivity groups. All scores used in the test of the hypotheses were, therefore, controlled for the influence of RTT verbal productivity.

C. RESULTS

The results were analyzed by both parametric and nonparametric methods. For both analyses, three sets of comparisons were made: (1) adults with total children, (2) adults with older children (10-13 years), and (3) older children (10-13 years) with younger children (6-9 years).

Table 3 shows the results of *t* tests comparing the mean RTT motivation scores of the different age groups. Even when scores are controlled for verbal productivity, Motivation R shows the expected increase with age. Adults have a significantly higher Motivation R than children, and the Motivation R of older children is significantly greater than that of younger children. None of the groups differs significantly in Level 1 motivation, the lowest level of the hierarchy. For all groups, the absolute differences are greatest at Level 2, which is the most frequent score at all ages (see Table 2), but the great variability of the Level 2 scores among the adults renders these differences considerably less reliable than the smaller differences found at Levels 3 and 4. Thus, in the comparison of adults with total children, the most significant differences appear at Levels 3 and 4, the highest levels of the hierarchy, and the order of differentiation is, as hypothesized, increasingly sharp at successive levels from 1 to 4. The probability of this order arising by chance is 1/24, or less than .05. As would be expected, the differences are less marked when adults are compared only with the older children of the group (10-13 years), though here also, the reliability of these differences follows the same pattern of increasing significance from Level 1 to Level 4 of the hierarchy. In the comparison of older with younger children, a significant difference is obtained only at Level 2, scores at Levels 3 and 4 failing to discriminate significantly between the two groups although the differences are in the hypothesized direction. There were very few scores at Levels 3 and 4 among both groups of children (see Table 2). Eleven children received a single score at one of these levels, and five children, four of whom were in the older age group, received more than one such score. With these few exceptions, Level 2 constituted the "upper" motivational level among the children, and a significant difference between the older and younger children at this level is in accord with the hypothesis.

TABLE 3
t-TEST COMPARISON OF AGE GROUPS ON RTT MOTIVATION

RTT motivation variable	Adults vs. Total Children			Adults vs. 10-13 yr. children			10-13 yr. vs. 6-9 yr. children		
	Diff. between means	SE Diff.	t	Diff. between means	SE Diff.	t	Diff. between means	SE Diff.	t
Motivation R	6.01	1.30	4.64^{c}	4.98	1.67	2.98^{b}	3.18	.94	3.40^{b}
Level 1	.38	.48	.79	.63	.61	1.03	—.08	.65	—.12
Level 2	3.40	1.08	3.14^{b}	2.59	1.27	2.04^{a}	2.43	.74	3.26^{b}
Level 3	.56	.14	4.11^{c}	.53	.16	3.21^{b}	.10	.08	1.25
Level 4	1.22	.29	4.16^{c}	1.19	.33	3.56^{b}	.25	.20	1.22

NOTE: All differences were computed by subtracting the mean of the younger group from the mean of the older group.
[a] Significant at the .05 level.
[b] Significant at the .01 level.
[c] Significant at the .001 level.

In Table 4, the same age groups are compared in terms of individuals falling above and below the medians of the various RTT motivation variables. The resulting χ^2 values confirm the findings obtained by t test with two exceptions. When individuals are compared rather than means, the adults and older children (10-13 years) differ significantly only at Levels 3 and 4 of the hierarchy. The two groups do not differ significantly in Motivation R and in Level 2 scores, suggesting that the significant differences found between the means of these variables may be due to a few high scores among the adults or a few low scores among the older children, or both. An inspection of the distribution of Motivation R scores revealed two very high adult scores, but an omission of these subjects did not substantially reduce the significance of the difference between the mean Motivation R scores of adults and older children. However, an inspection of the distribution of scores at Level 2 revealed that four adults had scores so high as to be discontinuous with the rest of the distribution and one of the older children had a score so low as to be discontinuous with the rest of the distribution. When these five subjects were omitted and new means and variances were computed for the remaining adults and older children, the difference between the means of the two groups at Level 2 was reduced from 2.59 to .49, and the corresponding t value became .54 or insignificant. This finding suggests that the difference between adults and older children at Level 2 is exaggerated by the use of a t test, and is probably better represented by the χ^2 value of 1.44, which is not significant.

D. DISCUSSION

By both methods of analysis, the findings confirm the hypothesis of a developmental hierarchy of motivation as proposed. Over the three groups studied, there is an increase with age in the sheer number of reinforcers appearing in the RTT fantasy material of these subjects, suggesting the quantitative expansion hypothesized to occur in motivational development. Further, adults differ increasingly from children at successive levels of the proposed hierarchy. The three age groups studied reveal approximately equal Level 1 motivation, or approximately equal concern with concrete, internal reinforcement. This need not be surprising. There are decided limits to quantitative expansion in a realm comprised of such reinforcers as food, drink, physical comfort and safety, and it may be that this limit is reached at an earlier age than that represented by the youngest group of this study. Thereafter, changes may occur in what constitutes acceptable food and drink, or in what seems to threaten physical safety, but there is apparently little increase in the number of such reinforcers. At Level 2 of the hierarchy, both adults and older

TABLE 4
χ^2 COMPARISON OF AGE GROUPS ON RTT MOTIVATION
(df = 1)

RTT motivation variable	Adults (N = 36) % above median	Children (N = 68) % above median	χ^2	Adults (N = 36) % above median	10-13 yrs (N = 32) % above median	χ^2	10-13 yrs (N = 32) % above median	6-9 yrs (N = 36) % above median	χ^2
Motivation R	77	40	10.78[c]	64	47	1.99	63	36	4.72[a]
Level 1	59	50	.56	59	45	1.10	41	47	.30
Level 2	66	39	5.80[a]	58	44	1.44	71	31	8.87[b]
Level 3	33	4	15.95[c]	33	6	4.84[a]	9	3	—
Level 4	64	18	22.54[c]	64	22	12.13[c]	25	17	.31

NOTE: Frequencies used in computing χ^2 have been converted to percentages to facilitate the comparison of different groups.

[a] Significant at the .05 level.

[b] Significant at the .01 level.

[c] Significant at the .001 level.

[d] At these levels, the median score was zero and comparisons were necessarily made between individuals above the median and individuals at the median.

children reveal significantly more reinforcers than do the younger children, apparently reflecting more sources of reinforcement in the external world of objects and people. Concrete reinforcement of this kind seems to approach an asymptote at the age level represented by the 10- to 13-year-old group, as the adults do not show a clearcut increase over this group in Level 2 motivation. At the abstract levels, 3 and 4, differences between adults and children were highly significant. Abstract reinforcement in the form of one's own judgment of approval or the imagined judgment of others was rare among the children, while 83 per cent of the adults gave evidence of familiarity with this kind of reinforcement.

These findings suggest a course of motivational development which has implications for a number of areas. If, for example, the pre-adolescent child cannot typically be counted upon to respond to "abstract" reinforcement, it becomes wasteful for teachers to try to educate him in learning "for learning's sake," wherein he is expected to "realize himself," compete only with himself, etc. If he applies himself to the task of learning, it will more likely be because this task involves enjoyable concrete operations, or is rewarded by concrete symbols of achievement.

In the area of social adaptation, motivational development undoubtedly plays a crucial role. If normal development follows the course suggested by the findings of this study, the plight of the adult who has failed to fully attain this development is immediately apparent. Such an individual is likely to be unduly dependent upon concrete reinforcement from the environment, and consequently unduly vulnerable to adverse shifts and changes in this environment. This may be one explanation of the low frustration tolerance, dependency, and instability which characterize some behavior disorders. Such individuals have frequently been regarded as showing disturbance in "superego functioning" or as lacking "internalized values," etc. In terms of the present framework, they may be regarded as lacking the stable sources of internal reinforcement which are necesary for the independent and self-disciplined functioning which our society demands.

Further investigation will require some behavioral validation of the RTT motivation scores, as of course, reinforcers and reinforcement are not directly measured by the RTT and have not been measured in the present study. Only the subjects' reported perceptions and interpretations of fantasied behavior have been measured. The conclusions drawn rest upon the assumption that such interpretations are necessarily made in terms of reinforcers with which the subject is familiar, and that the absence of mention of a whole class of reinforcers constitutes evidence that this class of reinforcers is not significant in the subject's experience. Such methods and assumptions are obviously unnecessary for observable responses and observable reinforcers, but there seems to be no more direct way of measuring the reinforcing responses which occur covertly within an individual's own response system, although the importance of such responses has been recognized by a number of writers —for example, Mowrer and Ullman (10), Dollard and Miller (3), and Skinner (12). All of the projective techniques, of course, attempt some assessment of an individual's covert, symbolic responses. The RTT has certain advantages in this respect. Requiring the subject to take the roles of the various actors in his stories necessarily obliges him to deal with the supposed covert responses of each actor. It is a common occurrence to have a seemingly flat story "blossom" in the role-taking portion of the test to reveal feelings, thoughts, perceptions and interpretations which could never have been surmised from the initial story. RTT protocols are especially rich in such material.

The RTT scoring system for motivation has a precedent in the McClelland (9) scoring of achievement motivation. The RTT scoring system is more comprehensive and, obviously, the classification of motives is quite different from McClelland's. In the RTT system, "achievement" may be classified at Level 2 if, for example, it is seen by the subject as a means of making more money, or at Level 3 if it is seen as conferring status, or at Level 4 if it is seen as an opportunity for self-actualization.

Some of the methodological difficulties encountered in the development of the RTT motivational scoring system may be worth considering for the sake of the general questions they raise about measures obtained from fantasy material. With the RTT, it soon became apparent that it was a hazardous procedure to relate any one of the motivation scores to a criterion and ignore the other motivation scores. For example, a hypothesized relationship was found between social adequacy and Level 4 motivation, but upon further investigation it appeared that scores at Level 2 and Level 1 were even more highly related to social adequacy (6). All of the scores were related to the subjects' verbal productivity—more productive subjects having higher scores at every level—and verbal productivity itself was related to social adequacy. When verbal productivity was partialed out, many significant correlations disappeared. Similar findings have been reported recently by Lindzey and Silverman (7) in a study of TAT verbal productivity. It is not uncommon to read reports of research in which measures of a single motive obtained from fantasy material are related to some variable with no concern for other motives which may appear in the same material, much less for the subjects' general productivity. Experience with the RTT suggests that such relationships cannot be confidently interpreted at face value. Verbal productivity is a variable for which there is no ready interpretation—it is not related to intelligence among our subjects—and partialing out such a variable may not always be the wisest course, but certainly scores obtained from fantasy material should be examined for its influence.

E. Summary

A hierarchy of motivation, following Maslow's (8) general scheme, was formulated in terms of four levels of development. Successive levels of the hierarchy were intended to reflect the hypothetical progress of an individual in the gradual acquisition of learned or "secondary" reinforcers, culminating in his development of a source of symbolic, internalized reinforcement such as is manifested in self-approval and self-actualization. Motivational development was regarded as a cumulative process, reflected in a general quantitative increase of effective reinforcers with age, as well as in qualitative development from one level to another in the proposed hierarchy. Older age groups were expected, therefore, to show a greater number of reinforcers than younger age groups, and older age groups were expected to differ increasingly from younger age groups at successively higher levels of the hierarchy.

Three age groups, comprising a total of 104 subjects, were studied: adults (mean age 36.0 years), older children (10-13 years), and younger children (6-9 years). Motivation was assessed from fantasy material produced by the subjects on the Role-Taking Task. The scoring system developed for this instrument yields a score for each of the four levels of the proposed motivational hierarchy. The scores were controlled for the verbal productivity of the subjects, and comparisons were made between the three age groups at each level of the hierarchy. The results confirmed the broad outlines of the hierarchy as proposed. There was a general increase with age in the number of "reinforcers" appearing in the Role-Taking protocols. None of the groups differed significantly at the "earliest" or lowest level of the hierarchy. Older children differed significantly from the younger children at the second level of the hierarchy, and adults differed significantly from older children at the third and fourth levels of the hierarchy. As hypothesized, adults differed increasingly from both groups of children at successively higher levels of the hierarchy. Such increasing differences were not found, however, between the older and younger children. The symbolic reinforcement represented by the third and fourth levels of the hierarchy

was rarely mentioned by the children, and there were no significant differences between the two age groups at these levels. The second level of the hierarchy seemed to constitute the effective "upper" level of motivation among both groups of children.

Possible implications of the findings in the areas of education and social adaptation were considered. The limitations of the Role-Taking Task as a measure of motivation, and the general difficulty of assessing reinforcement at symbolic levels, were discussed. Experience with the Role-Taking Task suggests that scores derived from fantasy material should be examined for the influence of verbal productivity.

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The Journal of Genetic Psychology, 1962, **100**, 377-379.

BOOKS

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